

A high-angle photograph showing a person's foot on a wooden log bridge. The bridge is made of several large, weathered log sections with visible wood grain and knots. The bridge spans a body of water, and the surface of the water is covered in bright, shimmering reflections of sunlight. The overall scene is bright and natural, emphasizing the connection between nature and design.

# WHEN NATURE HACKS DESIGN

Zach Camozzi - Masters of Design Thesis





# WHEN NATURE HACKS DESIGN

Earthbond Prototyping, a method to connect design with nature.  
Prototyping through a series of case studies that show progressive (increasing) immersion in nature.

by

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# ABSTRACT

This thesis details my journey of learning how to design in partnership with nature. This process took place in sequence; increasing the distance from home: the front yard, the park, and finally in remote wilderness. All of these places demanded full body attention, producing rich experiences that were unpredictable, thought provoking and brimming with content for creativity. I experimented with the boundary of control between designer and nature, inviting nature to engage with me through experiential prototypes that probed the division or relationship between design and nature. I learned how some of the tools and mindsets of a designer supported this engagement or hindered it.

I offer a method for designers who wish to connect more fully to nature in their work, called Earthbond Prototyping. Earthbond prototyping borrows from experience prototyping, designing to produce engagement “between people, places and objects that unfold over time” (Buchenau et al, 2000 p.431). I use the skills and techniques of design to navigate boundaries between aspects of the natural world to recognize new relationships between design and nature. More than ever designers need to instinctually allow environmental ethics, and principles held within nature, to inform and challenge their design decisions.

*‘With less time spent immersed in the outdoors we diminish our potential to understand the lasting value in nature exploration, build empathy for ecological systems and are less capable of understanding sustainability’ (Orr, 2005, p.xi).*

# KEYWORDS

Nature Immersion  
Outdoor Education  
Experiential Prototyping  
Environmental Education  
Ecologic Self  
Earthbond Prototyping  
Bio-Inclusive Design





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Earthbond prototyping is inspired by many published & unpublished works including; Helene Day Fraser and Mia Daniels' *Contemplating Puddles*, Alli Edwards *Playing with Typography*, Lisa Novak's *Classroom Tape* and Aaron Oussoren, Helene Day Fraser and Keith Doyles' *Glass Slipper Caper*. Further inspiration comes from contemporary artist Andy Goldsworthy.



“[Students] are eager to be introduced to ways of thinking and living that will shift their consciousness from the problematic industrial–military–consumeristic mindset to one that is ecological, holistic, compassionate and aligned with the earth.”  
(Bai, 2012, p.312)



# PREAMBLE

My undergraduate degree is in Mechanical Engineering. As someone who now navigates both worlds of engineering and design, I understand the degree to which engineering is driven by purpose. Efficiency, tangible and fiscal outcomes are the primary criteria for success in engineering design. There is pressure on engineers to produce outcomes that are safe, will last the promised lifespan and can be affordably manufactured. Engineering is a way of thinking that focuses on making a design workable with clear directions that allow a user to get to the desired outcome. This paints engineers as rigid and linear, when it is really a state of control.

The prescribed routes and a benchmark of control in engineering diminish the potential for diverging and learning about unexpected or potential connections between design, people, things, and the natural world. Engineers choose to pursue paths that have a high probability of success. The faster and safer route, though valuable when necessary, does not recognize how much there is to learn on a journey that explores unique design methodologies. A meandering route can be more challenging, beautiful, and fulfilling. So rather than stay within a controlled engineering paradigm, I travelled after graduation and worked a broad range of jobs that ultimately lead to a career as an outdoor guide and educator. I was still often called on to apply my engineering skill sets, but Outdoor Education changed my views on engineering and design.

*It is not a matter of abandoning the left hand side, even if this were possible, It is a matter of 'stepping out' of this paradigm, and recognizing it – so that we master it, rather than it mastering us. In this way we can employ these approaches but only when they are appropriate to the situation' (Sterling, 2001, p.82).*

Outdoor Education seeks to instill skills in youth and adults that revolve around exploration in multi-sensory environments, calculated risk and self-reflection. It is about creating a love for the outdoors, which E.O. Wilson calls Biophilia, “The innate tendency

**Figure 1:** Stave Lake B.C., documenting observations from testing equipment designed for canoe trip on the Peel River



to focus on life and lifelike processes” (1984, p.1). In most cases focusing on these processes allows participants to experience the world in a way they find unfamiliar and awe inspiring. It differs from Environmental Education in that in Outdoor Education learning is done experientially at every opportunity, not through abstract concepts and devices, such as television or a photograph. It is a phenomenological approach, learning through ‘felt sensations’ and reflecting on these subjective situations (Bresler, 1996, p.11).

As an outdoor educator, I relied on hands-on making; workshops that centered on building boats, fires, and shelters of wood, snow or earth. I explored material practice through the dirt, sand and mud between my fingers: Outdoor Education has given me the tools to navigate design outside a design classroom. Learning through doing built my confidence, opening up possibilities to expand my understanding of the world and helped me find a moral link to the ecological systems that support human life. I discovered what I wanted to design for.

Many believe Outdoor Education is solely about recreation. They imagine going to natural settings and having fun in a beautiful place: camping with friends, learning from a naturalist or adventure sporting. But if these experiences are recognized as catalysts to deep learning, wondrous insight can occur. Now that I have fully incorporated my experiences and my education I cannot enjoy the view from the top of a mountain without sensing the wind cooling my sweat-soaked brow: my body is engaged. Standing exposed at height makes me feel small and fragile on a large planet: I reflect on my place in the world. Seeing the dirt on my boots and the path laid in the soil to get to a destination builds understandings of conservation: I understand that my daily choices have impacts. Even the clothing and equipment I wear speaks to our values: warmth, comfort and possibly appearance. These thoughts come from choosing to reflect on an outdoor experience from a deeper perspective. Experiences are multi-faceted and share edges with the “way we think, perceive, sense and feel” (Bai, 2012, p.3). Feelings of fragility on the peak of a mountain can lead to comparisons with the broken earth on a fragile path. Accepting that each experience shapes the perspective on others approaches holism. “The whole is greater than the sum of the parts” and each part alone affects the whole (Naess, 1995, p. 241).

These forays into understanding the world through the lens of Outdoor Education sparked my curiosity about other ways of designing. I joined Emily Carr to do a Masters of Design, with expectations for the holistic and moral aspects of Outdoor Education to continue to influence my path.

*“[Students] are eager to be introduced to ways of thinking and living that will shift their consciousness from the problematic industrial–military–consumeristic mindset to one that is ecological, holistic, compassionate and aligned with the earth.” (Bai, 2012, p.312)*

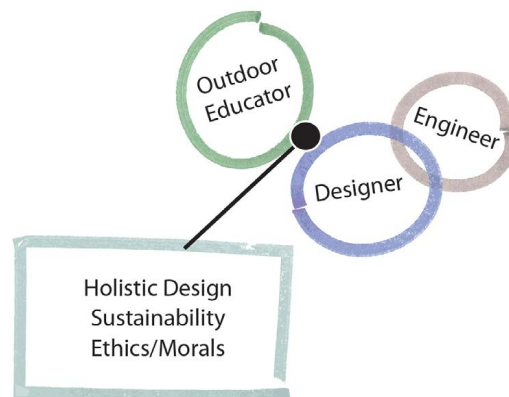
While studying design at Emily Carr I became aware of an uncertainty between prioritizing the needs of people and the needs of the natural world. At first I was unaware of this tension, happily soaking up research methods to engage with humans. Building personas, engaging in research probes, co-creation, even the format of my presentations were moving toward an audience of only humans, they were curated, static, and one-dimensional. I found myself leaning toward refined outcomes that I could explain, and away from the messy, sometimes unpredictable nature of Outdoor Education. My path transformed to be inclusive of the natural environment when I saw two students releasing helium balloons into the atmosphere to capture a photo. Did these students know that the plastic balloon fragments may end up hundreds of kilometers away? Possibly floating in and contaminating a water supply? As one of many students who strolled by during the release was I the only one that saw it as a self-centred action? I reaffirmed in that moment that my passion to connect to the outdoors, to nature, must be applied to the field of design. At the time I wasn't sure what the outcome would be, nor who came before me, but it felt like the necessary avenue to explore. Could I envision, understand, or apply a design practice intertwined with nature?

For years I had presumed that engineering was the source of my design aptitude, but after completing these two years at Emily Carr I realize I was wrong. Engineering taught me theoretical skills; mechanics of motion, modelling, material science, energy transfer and manufacturing processes. These are taught primarily using mathematics: defining how things behave in terms of physical relationships: size, quantity, movement, and force. In contrast, Outdoor Education uses physical relationships, a paddle flowing

through water or a rock scratching a palm, to teach empathy for nature and each other, how to feel and sense our relationship with our surroundings. Outdoor Educators prepare students to thrive in adverse settings, feeling supported by the tools and equipment and understanding the environment as the third teacher. Curiosity and knowledge is nurtured through immersion in ecology. This experiential learning allowed me to cultivate a deep tacit knowledge as well as a desire to seek challenges at the extremities of my ability. Physical goals, such as mastering a skill in paddling, allowed me to challenge progressively rougher water but over time it became more of a challenge and a reward to teach others to pursue the same skill. The combined skills from engineering and outdoor education supported me on the path to becoming a designer who collaborates with nature.

I came into this master's with a desire to understand concepts and methodologies of design that were outside my experience. Little did I know how powerfully my past experiences in engineering and Outdoor Education would influence my views of design. This breadth of experience has inspired me to explore a method for bridging Outdoor Education and design education, so that others may learn this as well.

*'Sustainable education is about integrating and balancing process (what education is) with purpose (what education is for) so that they are mutually informing and enhancing.' To promote 'trans-formative thinking and encourage change toward a fairer society and better world' (Sterling, 2001 p.25-26).*



**Figure 2:** Mapping the bridge between Design, Engineering and Outdoor Education



# GLOSSARY

**Bio-Inclusive Design:** design that factors nature into all stages of the design process, as a participant in design, and as an identity to be designed for

**Curriculum:** subject matters that are offered or taught in a place of learning

**Earthbond Prototyping:** A method of prototyping that includes nature as a variable/ participant in all stages of design. This immersion in nature through design, gives the designer the opportunity to understand the integral relationship between environment and design while simultaneously building ecologic self.

**Environmental Education:** Is the exploration and positive action toward environmental issues through engagement in problem solving and critical reflection. It does not necessarily occur outdoors nor focused on local environments.

**Ecologic Self:** “The ecological self arises from empathic identification with “all living beings, beautiful or ugly, big or small, sentient or not” (Naess, 1988; 2010, p.81)” (St Pierre, 2015)

**Ecologically dense environments:** When ecologic information cannot be ignored, producing rich full body experiences that are unpredictable, memorable and thought provoking.

**Experiential Prototypes:** Experiential prototypes differ from other forms of prototyping in that they are scale prototypes implemented in context to understand “what it might be like to engage with the product, space or system” (Buchenau et al, 2000 p.424-425). This allows researchers and users to experience the prototype through perception (senses), action, and reflection (thoughts).

**Framed Problem:** the range of variables that define a design problem and directly affect decisions that lead to an outcome

**Immersion:** Placing oneself in an area of, and opening up to, information that is deep, complex, likely non-linear, and full of possibilities

**Monoculture:** cultivated or naturally occurring environmental conditions that only support a single organism

**Nature:** The “self-originating material/ spiritual world, of which we are a part, including the powers that sustain and govern it” (Bonnett, 2002).

**Outdoor Education:** Outdoor Education seeks to instill skills in youth and adults that revolve around exploration in a multi-sensory environments, calculated risk and self-reflection. It is the development of the whole person (thought, perception, sense and feeling) through experiential learning.

**Prototype:** An artifact, system, even a drawing that explores an idea. Allowing the designer, user, environment or participants to evaluate, express or understand the idea and build upon it.

**Sustainability:** a society “that can persist over generations; one that is farseeing enough, flexible enough, and wise enough not to undermine either it’s physical or social systems of support” (Meadows et al, 2004, p.254). Sustainability encompasses all preventative and corrective earth maintenance.

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**Cover Image: Standing atop old growth stump in flooded Stave Lake B.C.**

A photograph of a residential neighborhood under a dramatic sky. In the foreground, the roofs and upper walls of several houses are visible. The houses have dark roofs and light-colored walls. Some bare trees are in front of the houses. The sky is a deep blue, filled with large, dark, billowing storm clouds. A bright patch of light is visible on the right side of the sky, suggesting the sun is behind the clouds. The overall mood is dramatic and atmospheric.

# CONTEXT, STRUCTURE, METHODS

Figure 3: Storm clouds roll over my front yard in the spring of 2016





# 1.0 RESEARCH CONTEXT

## 1.1 Sustainability, Nature & Biomimicry

*“In the face of current ecological crises, the primary task is perhaps not eradicating all behaviour that is harmful to our environment, what should be fundamentally adjusted is human attitude towards nature” (Wang, 2016, p.9).*

As an engineer I sought controlled plans and rational solutions. As an outdoor educator I favoured hands-on making and trusting my intuition. As a designer I envision a practice intertwined with nature that requires me to learn and share connections between design, people, things, and the natural world that take from all three of these disciplines.

Underlying my desire to investigate design’s relationship with nature is a desire for ecological sustainability. A sustainable society is one “that can persist over generations; one that is farseeing enough, flexible enough, and wise enough not to undermine either its physical or social systems of support” (Meadows et al, 2004, p.254). Discussions of sustainable design have evolved since the Brundtland report of 1987 (United Nations), but we have yet to understand how to “reorganize the way that we design, produce, sell, distribute, and consume artifacts in alignment with the requirements of the ecosphere” (St. Pierre, 2014 p.33). The importance of learning about nature and natural systems is currently not a strong part of sustainable design education. Designers are still regularly pressured to prioritize new technologies and human-centered innovations over nature.

Within this paper, ‘nature’ as defined by Bonnett is a “self-originating material/spiritual world, of which we are a part, including the powers that sustain and govern it” (2002. p.12). If we believe that nature is everything ‘self-originating’ we can accept that humans are a mammal with some uniquely evolved abilities. Design is one of those uniquely evolved abilities. Can we envision a design practice intertwined with nature?

Discussions of nature and design invariably lead to mention of Biomimicry. Biomimicry has permeated the field of design to the

extent that it appears to be almost the sole approach to design and nature. Popularized by Janine Benyus (1999), Biomimicry entails the observation of naturally occurring entities within an ecosystem then adapting those observations to produce “biological information in the form that designers need, which is functionally” (Westervelt, 2011, p.52). This focus on functional outputs suggests that Biomimicry objectifies the organisms that are under observation. They are valued only for their resource potential and positive influence on human standards of living. In this way, nature continues to be thought of as a repository of ideas for abstraction and innovations that are useful to humans. (St. Pierre 2015). Objectification removes empathy from the decision making process, diminishing the potential for cooperation with nature.

David Ruano a PhD in design philosophy also observes the limits of Biomimicry (2016). He asserts by tempering Biomimicry with Biophilic activities (activities that will ground an observer in the love of nature), Biomimicry can shift from “nature-inspired design to design that is in harmony and collaboration with, and within, nature” (p.173). Ruano recognizes prioritizing nature within design means working differently, in a way that may not fit into the current consumer culture that dominates design (Meadows, 1998). If Biomimicry objectifies nature it is a flawed starting point, even if it is modified to make the designer critically aware of the relationships between aspects of nature. “It is not solely what is taught that is of importance but how education takes place” (Holdrege, 2008, p.3). From the perspective of this research, biomimicry is an imbalanced partnership. True partnerships involve humility, something that can be described as the ecological self.

## 1.2 The Ecological Self

Arne Naess is an environmental philosopher that introduced the concept ‘ecological self’ (Naess (1988; 2010)). The ecological self is an arising identification with “all living beings, beautiful or ugly, big or small, sentient or not” (Naess, 1988; 2010, p.81) This identification can be described a deep connection with the natural world that is “innately ethical” (St Pierre, 2015, p.3). This is a natural tendency to act in ways that benefit all that we identify with. This is important because “transforming ourselves as we consider

ecological crises is more crucial than appealing to changing the physical environment” (Wang, 2016, pg 3).

An expanded sense of self in the world acknowledges that there are many important implications to every decision, and many types of lives are impacted. As discussed in the preamble, a helium balloon intentionally let go to float away eventually must come down. This decision to let go, or not, parallels the multitude of decisions a designer makes while completing a project. The materials we choose may be processed from a sensitive area with endangered species, or in a country with unethical working conditions. The manufacturing processes we choose could consume and contaminate a fresh water supply or could be half way across the world. Even the behaviours our products create could lead to environmental damage such as millions of plastic balloon fragments aggregating with other plastics in the ocean. Designers may make decisions that shape action and thought. More than ever these decisions must be directed toward biophilia and the arising of ‘ecological self’.

*‘This is the lived overcoming of the object view of the world and the affirmation of the participatory nature of reality’ (Holdrege, 2013, p.171).*

### 1.3 Design and the Ecological Self

Designers can nurture their own biophilia by engaging in bio-inclusive design, including nature as a partner in design by recognizing its influence on all stages of the design process and also considering the design’s impact on nature. Nature can supply the materials and inspiration for design but it also can provide the feedback needed to develop designs that are intertwined with nature. Ruono shares this belief with Todd (1984) “Design should be co-evolutionary with the natural world” (2016, p.7). For this to happen, designers must find ways to think differently.

Freya Mathews suggests ‘Human beings have the capacity to become psychically imprinted, in early life, with the inner organizational dynamics of nature’ (2008, p.19). Increased time spent immersed in nature can teach humans to instinctually organize information similarly to ecologic systems: competing, balancing resources and finding the most beneficial configurations for everything. For designers, this implies a process where reasoning

and designing evolves and is co-created with nature. This is the ability to “think like nature” (Mathews, 2008, p.19).

Designers can learn to ‘think like nature’. For the ‘ecological self’ to arise, designers can immerse in outdoor contexts where a high density of information can be accessed to meet the changing needs of each learner. These ecologically dense environments demand full body attention, producing rich experiences that can be unpredictable, memorable and thought provoking. As contexts evolve, cognition is developed through the combination and interpretation of actions, senses and thoughts (Kolb 1999). To illustrate this through an example: a model boat in a pail of water helps us explore and understand the concept of buoyancy. When the boat is on the beach tackling gigantic waves, immediately buoyancy is blurred with concepts of stability and momentum. If we get in the boat on the waves, stability, momentum, buoyancy, beauty and fear are just a few of the concepts that can be grasped at. Without immersive experiences in ecology, we can understand concepts but are less likely to discover, navigate, and allow them to evolve.

Design education currently has tools and processes that can be applied to facilitate immersive experiences in the outdoors. Unfortunately, design education may not yet prioritize this kind of learning because it has a history of “align[ing] to business and technology, learning their language, values, and priorities” (St Pierre, 2015, p.5). There are indications that design and design education might be orienting itself to include a more serious relationship with nature. This includes post humanist theories, conferences such as NORDES 2015: Design Ecologies, and pending publications on design and nature (Fletcher, Tham & St. Pierre, email correspondence, 2016).

Students of design who finish their education with a lasting deep connection to nature are more likely to prioritize design’s relationship with ecology within their practice. As designers have extensive influence on society it is crucial they strive to reach ecologic balance.

*‘[There is] a lack of embodied understandings that what we ‘take’, just here just now, is inevitably connected to the health of the planet’ (Tham, (n.d.), p.3).*



## 2.0 STRUCTURING THE RESEARCH INQUIRY

### 2.1 The Nature Connection Pyramid

To truly become familiar with a place we must go there, listen, watch and learn (Chambers, 2008). Familiarity with a place is possible when we have daily or weekly encounters with it. Outdoor educators understand that in order for students existing notions of nature to evolve, students must move from familiar outdoor settings to those that are less familiar (Sobel, 1996). They must also increase the length of time spent in all of those spaces.

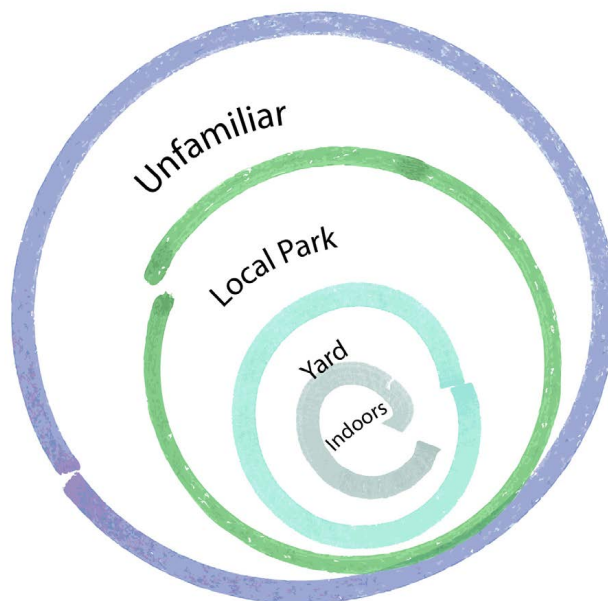
Risk can describe the unfamiliar. As the unfamiliar transitions to the familiar, tension decreases and our understanding of the preconceived risk develops. Outdoor Education allows students to navigate this boundary between risk and perceived risk, giving them the confidence to take future risks in other disciplines. Kenny Ballentine's *Nature Connection Pyramid* ([naturekidsinstitute.com](http://naturekidsinstitute.com)) illustrates the progressive shift from familiar to less familiar (fig. 4).

Familiar places explored daily are near the base of Ballentine's nature pyramid. Weekly/monthly visits to less familiar places populate the centre of the pyramid. At the Apex are annual visits to unfamiliar places. As one moves from the familiar to the unfamiliar, one may encounter increasingly unexpected conditions and experiences. The influence of weather, interactions with animals, encountering new materials and texture, even the way users interact with your work can be surprising.

*The Nature Connection Pyramid* provided the structure for my research explorations. I progressively widened my lens from 1) my *YARD*, 2) experiential survey in a *LOCAL PARK*, and 3) Canoeing in the *UNFAMILIAR* Yukon (fig. 5). These three locations were progressively further from what I found familiar. Each offered an increasing density of ecology.



**Figure 4:** Graphic interpretation of Ballentine's *Nature Connection Pyramid* (The Nature Kids Institute, 2017)



**Figure 5:** Graphic interpretation of widening the lens of *The Nature Connection Pyramid*



## 3.0 RESEARCH METHODS

### 3.1 Autobiographical Writing

Autobiographical writing complemented with photography is a form of data collection and dissemination that allows the reader to grasp the subjective; that is emotions, senses and thoughts that are necessary to be immersed. This leaves a lasting imprint on the reader (Orrick, 2015). David Abram exemplifies this method, writing extensive paragraphs that describe his experiences with objects, places and nature in sensual details. These writings capture the experience as a whole and direct the reader to pause and reflect on how they fit into the greater ecological system alongside the objects that support them (Abram, 2011). These narratives are a powerful and inclusive way to share insights that develop direct sentient engagement with that world and all its “ecological relations” (Hasebe-Ludt, 2009, p.29).

Throughout my research and design I journaled in this manner, against typical engineering tendencies to trust quantifiable data. The journal evolved from a template to direct my inquiry toward a practiced research tool that supported my own multi-sensorial engagement with nature. In *YARD: Nature close to home* I detail the development of the format of the journal and demonstrate how it is far more than a tool for my own learning. It is a structure for heuristic inquiry, “an exploratory approach to research...concerned directly with human knowing” (Hiles, p.389). The journal has qualities that can match the changing contexts of *The Nature Connection Pyramid* offering a “systematic way of incorporating the self into inquiry methods while ensuring a high level of reflexivity and transparency” (Hiles, p.392).

**Figure 6:** Studio space as a blank canvas



## 3.2 Experience Prototyping

Throughout design practice, prototypes (designed artifacts) are generated to externalize thinking and allow the maker to link tacit knowledge to conceptual understanding. Prototypes can be representations of the design problem with a focus on the look, feel or function. Feedback is commonly generated in a controlled form during a studio critique, a demonstration, or through input from other design team members (Buchenau, M., & Suri, J. F., 2000). Often in conventional design processes there is a necessary abstraction of the true context and timeline the prototype will inhabit. This type of prototyping allows for a discussion only on how it might be engaged with, the product's speculated use. Experience prototyping is a specific form of prototype that seeks deep understanding by placing the prototype in context earlier in the design process.

Experience Prototypes are full scale prototypes implemented in context to allow researchers and users to experience through perception (senses), action, and reflection (thoughts). The subjective experience that they afford through a user's active engagement is much more valuable for feedback than the physicality of the artifact (Buchenau et al, 2000). How grasping and transformation of experience to produce knowledge occurs depends on the history, physical and mental capacity of the investigator and the demands of the environment around them ((Kolb 1984, p. 41) (Kolb et al. 1999, p. 2-4)). Here design insights unfold over time through acts of making, speculated use, and unexpected engagement (Buchenau et al, 2000).

The qualities of Experience Prototyping detailed above that are foundational to Earthbond prototyping are: testing in context to seek subjective data from participants, making as research, and affording time to flush out the relationship between environment and design (Buchenau et al, 2000). These are detailed in the section *The Experiential Prototypes (p.13)*.

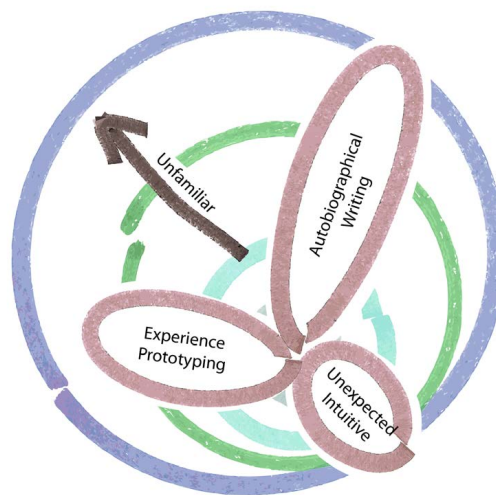


### 3.3 EarthBond Prototyping

Autobiographical writing combined with experience prototyping in natural contexts led me to an enriched prototyping process that supports important connections to nature. (fig. 7)

*Earthbond Prototyping* is a method that includes nature as a participant in all stages of design. Earthbond Prototyping is following the structure of *The Nature Connection Pyramid* to progressively expand boundaries to test concepts within contexts that are less familiar. The emphasis on a changing context is an opportunity for the designer to understand nature's relationship to the form or content of a design. Much like Experience Prototypes, Earthbond Prototypes must accurately represent the form required to elicit the intended experience.

*'The maximum success of self-realisation is realised through a certain balance of interactions between organisms and environment' (Naess, 1995, p. 41).*



**Figure 7:** Graphic interpretation of Earthbond Prototyping within the framework of *the Nature Connection Pyramid*



The background is a textured brown surface, possibly a corkboard or a piece of paper, covered with various research-related items. There are several Polaroid-style photographs of people in outdoor settings, some of which are partially obscured by text. Handwritten notes on yellow sticky paper are scattered throughout, containing questions and observations about design, nature, and play. Orange arrows and lines are drawn across the page, connecting different elements and suggesting a flow or timeline of research. The overall aesthetic is that of a creative and exploratory research process.

# THE EXPERIENCE & PROTOTYPES

The experiments took place following the framework of Ballentine's *Nature Connection Pyramid*, I progressively widened my lens from 1) Yard, 2) Local Park, and 3) Canoeing in the Unfamiliar Yukon (fig. 3). These three locations were progressively further from what I found familiar. Each offered important learning to support the development of Earthbond prototyping as a method for designers.

Figure 8: Questions and time line mapping of research explorations



REPAIR  
+  
REPURPOSE

ADHOC

OUTDOOR

GEAR  
FOR A SPECIFIC  
EXPERIENCE

FUNCTIONAL  
PERSONAL  
ATTACHMENT  
COMES FROM  
THE VALUE

- SAFETY
- COMFORT (CONFORM)
- VERSATILE

CAN I REPAIR  
ALL THE GEAR/  
CLOTHES/THINGS  
THAT ARE BROKEN  
IN MY  
HOME?

HOW DOES THIS  
CHANGE WHAT  
I NEED TO  
GET / HOW I THINK  
ABOUT WHAT I  
CAN GET?

CAN I ~~MAKE~~  
REPURPOSE  
GEAR ~~INTO~~ INTO  
SOMETHING ELSE?  
ADHOC - ADHOC  
WASTE

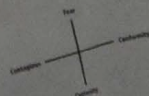
CAN I ADD FUNCTION  
AND AESTHETIC TO  
A SAFETY OBJECT?  
HOW DID THAT CHANGE  
MY PERCEPTION OF  
THE OBJECT?

IS PLANNING  
A FORM OF  
VISUALIZING  
FOR A SUCCESSFUL  
PROVIDED  
EXPERIENCE

HOW DOES THE  
REPURPOSED  
OBJECT CARRY  
OVER VALUE  
FROM THE ORIGINAL  
OBJECT?

WHAT  
DESIGN METHODS  
DO I USE IN  
MY PREPARATION  
FOR A  
TRIP?

DOES A  
SURVEY PLAY A  
ROLE IN MY  
DESIGN PROCESS?



I THINK  
THIS NEEDS  
A THIRD  
DIMENSION

CAN I EVEN  
ITERATE THIS?  
OR DOES THAT  
DEFEAT THE  
PURPOSE?

IS IT REPURPOSING  
IF I DON'T  
ACTUALLY  
USE IT?

Check on  
equipment  
that I am changing  
in



A large, mature cherry tree with dense green foliage dominates the foreground and middle ground. The tree's trunk is thick and textured, with several main branches spreading out. In the background, a grey house with white trim is visible, along with a wooden fence and laundry hanging on a line. The scene is set in a residential yard with a mix of natural and urban elements.

# YARD: Nature close to home

“We can recognize the biological barrenness of an urban place while realizing at the same time that we are connected to wilderness, by activity, and by the wandering creatures that are among us.” (Haupt, 2013, p.47)

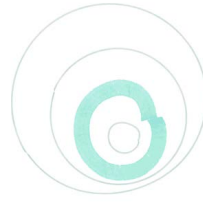
Figure 9: The large cherry tree depicted in Yard







## 4.0 YARD: Nature close to home



*'[If student] attention is continually drawn out of and away from their embodied and inhabited experience and is attached to abstract and discursive knowledge (information, fact, theories, ideas). The situation here is like not allowing a person to go outside, explore, and experience the lay of the land himself or herself, but insisting on having the person only look at a map' (Bai et al., 2009, p.324).*

The first, level of Ballentine's *Nature Connection Pyramid* identifies the need to occupy and engage with familiar places, daily. In spring 2016 I chose to intentionally sit on my front steps and contemplate a simple idea: In the suburban environment, our yards, the yards of others, and other green spaces near our homes are opportunities to learn about ecology and design.

My yard is home to a twenty meter tall fruiting cherry tree overhanging nearly everything on the property (fig. 9). In the early spring of 2016 my neighbor said "Why can't people clean up after themselves." The pollen from the tree was drifting down

**Figure 10:** My front yard seen from the top of our steps.



and covering his deck and cars. He personally believed the tree and everything it produced was the responsibility of our landlord. How could our landlord control the wind or the blooming of the tree? How many people believe that humans are meant to control everything in our environment?

Carolyn Merchant explains that this way of thinking can be traced back to the 17th century and directly to the seminal work of Francis Bacon. His thoughts carried through the industrial revolution “only by acting as an interpreter of nature could knowledge be turned into power” (1990, p.172 & 186). I wondered if I was demonstrating an attitude of control and domination of nature by simply cutting my grass; in essence I was maintaining my yard as a monoculture, cultivating a single organism (grass) for aesthetic appeal. What could I discover if I didn’t control the lawn? How would it inform my research about design and nature? I challenged myself to let the front yard (fig. 10) grow unattended for the entirety of the growing season, instructing the other tenants in my house not to cut the grass. I used photography and journaling to capture the experience.

Thoughts on ecology arose first; it took only a few days on my front steps to understand that I was not the only animal that frequented the space. The return visitors to my perch were three red shafted northern flickers. I watched the woodpeckers wade through the grass pecking for insects. Lyanda Haupt writes that the most visible biodiversity in Seattle’s urban environment, a similar climate and close neighbor to my own, are coyotes, moles, raccoons, squirrels and crows. She chooses a scale we are most familiar with and touches on a feeling we can all relate to: curiosity. “I don’t want to chase it away – all I want to do is watch it for as long as I possibly can” (2013, p.61). My indifference in keeping a dense lawn produced conditions for chafer beetles to prosper, attracting the woodpeckers. Taking the time to stop and watch outdoors, as I had just begun to do, led to several relationships between my design actions (or in this case inaction) and the natural world.

*‘We can recognize the biological barrenness of an urban place while realizing at the same time that we are connected to wilderness, by activity, and by the wandering creatures that are among us’(Haupt, 2013, p.47).*

## 4.1 The development of the journal: expanding my range of awareness

All senses contribute to how we perceive experience, sight being the preferred modality. Even so, sight involves more than the object of attention. In 1912 Koffka Kohler and Wertheimer's Gestalt concluded that visual "perception is a response not to individual bits of information but to a field of interrelated data" (Malnar et al., 2004, p.44). For example, a figure/ground relationship means the wall behind a painting (the context) changes our preference in that painting. Other senses also capture information that impacts preference in the same way. My desire to sit on the front stoop and what I was thinking could be changed by what I hear (my annoyance with a car horn) or by my neighbor releasing the fragrance of grass when mowing (what I smell).

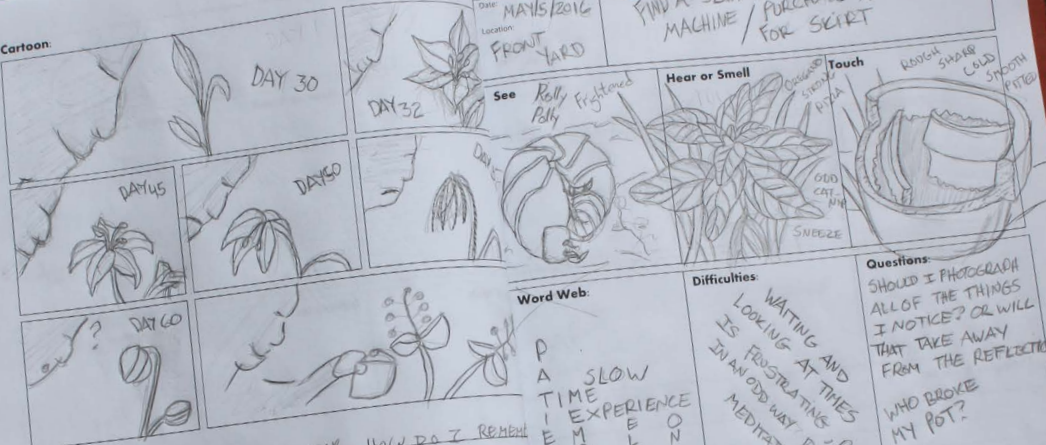
My process of capturing these experiences and thoughts (as data) manifested as a template for a journal (fig. 11). The template was a strategy to allow me to reflect in ways that were not all intuitive for me: on senses, actions, thoughts, and feelings (Buchenau et al, 2000, Bai, 2012). My past journals in both engineering and outdoor education had been instrumental approaches, seeking to capture only ideas for designs that I could develop in the future.

The journal template consisted of the headings *smell*, *hear*, *taste* and *touch* to prompt sensorial observations. A cartoon story board allowed me to capture changes over time, motion or a sequence of events. The headings *questions*, and *difficulties* helped me reflect on feelings. Over time the journal headings were changed to match other insights that arose: *motivation*, *actions*, *conversation*, and *animals*. This journal became a routine as I navigated through *The Nature Connection Pyramid*. I found I had to change the form to match each progression (fig. 11a-11d). Headings were crossed out, and neglected. Transparencies were added to layer data. It became a map for the trip in the *UNFAMILIAR* (section 5). Eventually, I no longer needed the template with its headings to produce intuitive reflections beyond just sight and a description of events. The practice of journaling evolved into autobiographical writing (section 3.1) one of the key research methods behind Earthbond Prototyping.

**Figure 11:** Personal Journal and developments a-d through **Yard**, **Local Park** and **Unfamiliar**



Cartoon:



Word Web:

PATIENTS  
SLOW  
EXPERIENCE  
BLAXED  
CONCIOUS

Difficulties:  
WAITING AND  
LOOKING AT THINGS  
IS FRUSTRATING, BUT  
IN AN ODD WAY BECOMES  
MEDITATIVE

Questions:  
SHOULD I PHOTOGRAPH  
ALL OF THE THINGS  
I NOTICE? OR WILL  
THAT TAKE AWAY  
FROM THE REFLECTION?  
WHO BROKE  
MY POT?

Thoughts & Ideas:  
COLLECT SEEDS FOR NEXT YEAR, HOW DO I REHEW  
WHICH ONES I LIKE AND THE CONDITIONS THEY  
GROW BEST IN? A CONTAINER OR FABRIC BAG,  
COULD THEY BE TRADED LIKE A GECKO? THE  
BLUE BELL SEEDS I SHOWED TO TERESA WAS  
REPEATED, I SAW HER SHOWING IT TO HER MOM  
WILL THESE SEEDS EVEN REPRODUCE? IS IT  
JUST HOARDING AND CONTROLLING WHETHER THEY  
SHOULD BE, WHEN IF I WAS JUST TO LEAVE  
THEM THEY WOULD PRODUCE NATURALLY HIGH  
AS WELL JUST HAVE ONE AND SEE HOW IT ALL  
WORKS OUT.

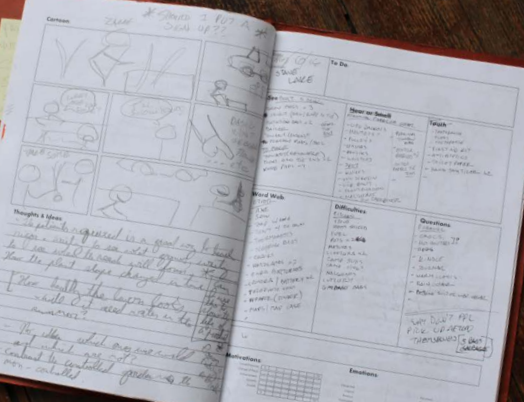
Motivations:

Curiosity	
Change of Pace	
Adventure	
Health	
FUN	

Emotions:

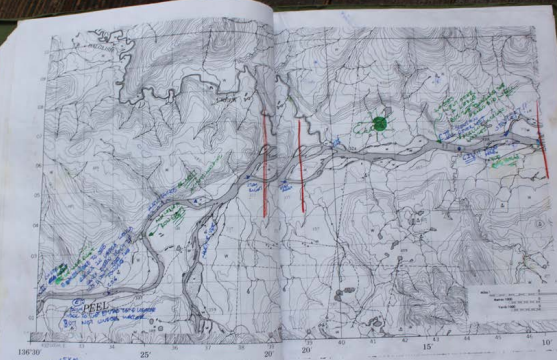


Cartoon:



Thoughts & Ideas:

...the plant is growing in a good way, it's not too big, it's not too small, it's just right. I like it. I like the way it's growing. I like the way it's looking. I like the way it's feeling. I like the way it's smelling. I like the way it's tasting. I like the way it's touching. I like the way it's thinking. I like the way it's feeling. I like the way it's smelling. I like the way it's tasting. I like the way it's touching. I like the way it's thinking.



...the plant is growing in a good way, it's not too big, it's not too small, it's just right. I like it. I like the way it's growing. I like the way it's looking. I like the way it's feeling. I like the way it's smelling. I like the way it's tasting. I like the way it's touching. I like the way it's thinking. I like the way it's feeling. I like the way it's smelling. I like the way it's tasting. I like the way it's touching. I like the way it's thinking.



Capturing data in this way lead me to explore my surroundings, seeking new perspectives on the small patch of yard. As the spring rains began, crocuses and blue bells arose between the blades of grass. The next addition that slowly formed the meadow were spices. Oregano and mint took over the lawn with a corner of dandelions. Up to this point I had been seeing the garden from my stoop and behind the camera lens. In time the journal became a prompt to touch leaves, smell the flowers and get my hands dirty. In this way my observation began to influence my making.

## 4.2 Experience Prototyping – Mint ‘Smell’ & Wet ‘Moisture’

I looked for a part of nature I could use to design and wrote the sense that appeared most abundant. I tore and wove mint stalks, and drew in condensation on my window. By writing the obvious perceived sense it is possible to experience and recognize others. The smell of mint is invigorating, travels, its roots are earthy (fig. 13). Moisture is cold, pooling, always transforming (fig. 12). By

**Figure 12:** Using a finger to write the obvious tactile sensation







“acting like a plant to understand plants” (Narby, 2006, p.94). and designing in response to and with nature I was able to navigate a multi-sensory and subjective experience I was struggling to understand.

### 4.3 Biodiversity becomes visible

After six months the change in environment of our front yard was profound: Sumac, Ivy, Morning Glory, Daisy's, Snap Dragons, Fox Gloves, Buttercups, Poppies, Iris's, Wild Raspberries, Blackberries, Rhododendron, and many I couldn't name (fig. 15). I had developed a heightened sense of awareness from journaling which benefited my observations but even those around me were beginning to notice how quickly the space was changing. Two other tenants in my 70 year old house began to spend time with me on the front steps. We discussed if the seeds had been dormant for years, planted from previous owners, blown in from neighboring yards or carried on the soles of our shoes. Countless variations of plant competed, were being tested and tempered by the environment around them, always seeking a balance of resources. The design was self-creating.

**Figure 13:** Weaving mint found in a garden bed at a local park





As the flowers bloomed and went to seed I wondered how I could share the time spent in the garden with the community around me. A seed cache became my means of making the link I was seeking.

#### 4.4 Prototype - Seed Cache

Trading seeds is an established practice in certain communities. Locally, the Village Vancouver food network supports seed saver collectives. These are online communities of individuals driven by a concern for future food security that are collecting, meeting and sharing seeds (Seed Savers, 2017). Taking this as a lead, I decided that the seed cache (fig. 14) could extend to the large online community of Geocachers. Geocaching is a form of recreation that uses Global Positioning Systems to direct participants to caches of objects, often plastic toys. I was attracted to geocaching because it promotes shifts in scale. Users follow a digital map, navigating on foot to a specific area, to search a five to ten meter

**Figure 14:** Seeds collected and cached from letting the front yard grow



radius for a cache as small as a film canister. In my yard I was beginning to understand that observing the environment from a macro and micro perspective is what allows us to see more and be open to nature's lessons. My intent was to distribute my cache prototype seeds within Geocaches to foster a way for them to trade and further shift the scale of the participants. The seed pod is the cache, the seed supplying the evolving engagement to carry beyond the existing experience; a method that fostered sustainable relationships with nature rather than simply a reward of a plastic toy.

I realized that, while giving potential for growth (literally and figuratively), this scenario did little to promote a key aspect needed for sustainability: the capacity to slow down. Going slow allows "qualities [to] emerge from the interaction of the parts" time to reflect on our actions, our desires and our outputs (Sterling, 2001 p.80). I was seeking a means for people to nurture the seeds growth. While the Geocachers could take the seeds home, plant them in soil and nurture their growth, there was also a possibility that my containers of seeds would just move from cache to cache, discarded when the novelty wears off or because there is no interest on the part of the Geocacher. I realized that my capacity to control people's use of my design initiation in this instance/format/medium was limited.

*'To induce in humans a moral point of view with respect to other-than-human life forms is to orchestrate synergistic interactions across the human/animal divide' (Mathews, 2008, p.18).*

## 4.5 Exploring the Yard: Summary thoughts

After hours of journaling, identifying plants, watching insects and birds, collecting seeds and hearing the sound of snap dragon pods exploding from tension in their drying husks, I realized that by doing nothing but immersing myself in being in the yard, I had made a significant change to my own behavior. The community around me had also responded. The risk I took in offending my neighbor who believed the yard should be controlled paid off. He grumbled but helped me identify many of the seeds that could be blown into his yard.

**Figure 15:** Some of the flora that bloomed in the yard







My exploration of *Yard: Nature Close to home* provided emerging insights about prototyping with nature:

**The Journal** is a valuable tool to **engage with nature holistically**.

It goes beyond just sight and a description of events, capturing how all senses take part in perceiving experience. Practicing journaling outdoors fosters engagement with a dynamic or unpredictable environment that is inherently multi-sensory and experiential. The journal became a tool to help me appreciate nature for its dynamic response to change through multiple senses. It takes practice for this mode of sensing to become intuitive, and the journal helps to trigger that practice.

Letting the yard grow was a choice to engage with a social risk. At times I feared the judgment of my neighbors, but it surprised me in how it allowed me to engage in physical risks. Playing with unknown materials, the flowers invited insects, animals, other humans into a space that I previously kept under my control. This control was based on a preconceived idea of how the environment should behave.

**Figure 16:** Changes in my front yard over four months





It is this type of loosening of control that is counter intuitive for designers, because intending to change an environment is often what designers do.

**Loosening control** leads to opportunity and observations that are beyond the perceived risks. Loosening control accepts unplanned outcomes as invitations to explore other than a problem for design to overcome. In this way it can carry research forward to new ground.

When situated outdoors this can be a gateway into understanding ecological scale. By moving from observing animals at a distance to insects at our doorstep we can change our way of thinking, cultivating this ability to shift scales while observing allows us to take in a broader picture and learn more from the world around us.

The benefits from non-gardening came to an untimely end when I went to the Yukon for six weeks. I returned to find the front yard had been mown and the garden beds stripped of everything but the iris leaves. It was barren, controlled, and felt boring. My landlord had assumed that we were not caring for the space and hired a landscaper to return it to its 'socially accepted' state. Our society resists leaving nature unattended.





## LOCAL PARK: Exploring further from home

“If we are not courageous enough to take responsibility for our manner of being in the world, to that degree we are compromised moral agents.”  
(Bai, 2012, p.311)

Figure 17: Balancing on logs washed ashore near Spanish Banks







## 5.0 LOCAL PARK: Exploring further from home



*"You can discover more in an hour of play than in a lifetime of conversation"*  
- Plato

The second progression in Ballentine's *Nature Connection Pyramid* is the act of visiting less familiar places that are likely to produce surprising conditions. To explore this I chose Spanish Banks, a suburban park situated between single home dwellings and the ocean. Spanish Banks supports heavy recreational use. Visitors commonly spend time on the expansive foreshore, between high and low tide, exploring, swimming, playing and relaxing. I developed a series of installations to function as a survey (fig. 18, Appendix B). The experiential survey explores questions that arose from the early stages of *YARD*. In particular, I was interested in what is the nature of connection, are their degrees to it in the urban setting and how the general public finds opportunities to engage with nature in spaces outside and within park-like locations such as Spanish Banks.

**Figure 18:** Experiential Survey at Spanish Banks





*LOCAL PARK* took place over three weeks, and generated a range of responses from the public. It also drew out intuitive responses from me in the form of experience prototypes. The following section discusses selected examples from this phase, such as making sandcastles and walking through weeds. These unexpected moments in nature along with the planned survey helped to develop Earthbond Prototyping.

## 5.1 Experience Prototyping - Sand Castle Barricade

I set up my experience survey at Spanish Banks adjacent to a walking path. The survey was located on edge of the sandy beach with a backdrop of sand flats from low tide. The walking path is a high traffic area for pedestrians, bicyclers and beach goers heading onto the beach.

While waiting to engage with the public that approached my experience survey I watched the rising tide from the logs distributed along the beach front. I noticed several sandcastles destroyed by incoming waves. In some cases the children building them were determined to thwart the tide and constructed elaborate sand barricades to delay the inevitable. They were playfully enjoying their relationship with nature. Arguably, the children were extending sand castle building into acts of observing. Much like I had when non-gardening in my yard, they were taking the time to observe and reflect on their actions. Intrigued, on my second trip to Spanish Banks I decided to build sandcastles along with setting up the experience survey.

On my return to Spanish Banks, I brought a corrugated plastic ring to build a barricade to attempt to hold back the tide. (fig. 19) As the tide



**Figure 19:** Sand Castle Barricade used over three weekends



rose and surrounded the castle I watched it slowly succumb to the taller rogue waves. Not only did I make a way to engage with nature, the prototype encouraging me to take the extra time to observe the response of nature, the waves eroded the sandcastle. Once a week for three weeks I returned to set up my experience survey and build large intricate castles inside and around the ring. I controlled the design only temporarily, up until nature intervened. I was building an ephemeral understanding of control.

The castles rose to the surface of the water and eventually washed away. This attracted other builders and provoked the curiosity of other beachgoers, including seagulls and dogs. It was an experiential prototype that produced conversation about interacting with nature as a child through its “simple invitation to play” (Riikonen, 2015, p.43) and the time which that afforded.

## 5.2 Experiential Survey - Directional Choice Signs

The directional choice signs for my survey are made from salvaged plywood, PVC conduit, oak trim from a dresser and scrap metal (fig. 20). The conduit is flexible, allowing the signs to sway in the sand and the used plywood suggests they are non-precious and open for rough engagement. The participants were encouraged to wander through an array of sign boards that have a question, two choices and sliding counters.

Over the three weekends I spent several hours watching participants navigate the signs. This navigation struck me as more significant than the answers they chose. These participants did not fear judgement and allowed their curiosity to guide them. Having no clear finish or objective, participants felt little pressure to do it quickly. Their curiosity manifested in different techniques. Participants often turned back to rethink answers upon seeing the next question, stare intently at a specific questions, or just skipped through to read them all to plot out their pathway. The time taken to come to personal solutions varied. I could imagine this survey method with 50 signs and applied to other research, the scale itself attracting participants.

**Figure 20:** Directional Choice signs set up at Spanish Banks. Participants voted via the wooden counters at the bottom of each sign.







### 5.3 Experiential Survey - Fear Box

The fear box was made of salvaged rough cedar. Slivers of wood and screws are visible and sharp (fig. 21). The dark orifice suggests that there is something hidden inside that complements the form of the box. The prototype materials and form are intended to prompt a feeling of unease, ostensibly to prepare the participant to answer the survey question. “Are you scared, anxious or apprehensive of anything in urban green spaces you come in contact with regularly?”

Adults acted with caution around the fear box. They approached, read the sign, contemplated, looked around and in many cases walked away. These participants could clearly understand the simple question but chose not to engage with the box. There are a myriad of reasons for this, from being too busy, feeling uncomfortable (Is it full of bugs? Is this a trick?), or not being interested. Ultimately none of their responses contradicted my expectations: I had



developed the fear box out of a presumption that many people are fearful of the unknown.

The responses to the experience survey and following written survey are in Appendix B. They talk of socially driven fears; garbage, needles, strangers in urban green spaces. They lack conversation of ecology present in the urban setting. This leaves open the question of whether or not users of Locarno beach understand nature, or take nature for granted in this context.

*If we are not courageous enough to take responsibility for our manner of being in the world, to that degree we are compromised moral agents' (Bai, 2012, p.311).*

## 5.4 Ecophobia vs Biophilia

City parks are meeting places where cultures can intermingle and collide, opportunities for social interaction, exploration and self-discovery (Merewether, 2015). Nonetheless, much of the literature points to how many of us are afraid of the outdoors (Strife, S., & Downey, L., 2009). How can we connect to the outdoors if we are too afraid to interact with it?

Gary Snyder and David Abram discuss the issue, ecophobia, the “terror of the very wilderness that nourishes and sustains us” (Abram, 2011, p. 69). They layer it into experiences of adults hiking, living, relaxing and connecting with nature. They strive to get their readers to embrace biophilia, our bond to greater ecological systems and to realize ‘what a big potlatch we are all members of!’ (Snyder, 2010 p. 19) Biophilia or ecophobia begins when we are children and it is our experiences and education that define which way we lean. A friend may have been bit by a garter snake or you stepped on a bees nest. This love or fear sticks with us as we age and guides the narrative that allows us to map and navigate our world (Chambers, 2008).

**Figure 21:** Fear Box Survey at Spanish Banks



## 5.5 Mini Research Narrative - Weed Sandals

As a child I use to fear the feel of seaweed wrapping around my legs as I swam in the ocean. While walking on Spanish Banks beach I contemplated this story of discomfort, as seaweed caught on my toes in the shallows. I picked some up and threw it in the air, tossed it from hand to hand and then started wrapping it through my fingers. This lead to a moment of 'awe', where I realized I was designing. The simple intuitive motions of my body were creating seaweed configurations. I was creating structures on my hand, creating gloves of weed (fig. 22).

This escalated into swirling my feet in the tide pools for a moment; shoes of weed appeared. Voila! I repeated this thirty times getting a new unique sandal form each time. The seeming randomness of the seaweed entwined with my motions supplied the changes necessary to quickly generate iterations. In a short time the discomfort of being tickled by the seaweed disappeared. My curiosity overcame a mental fear and highlighted the true risk. Were my design actions worth the damage to the sensitive ecosystem? I had walked down the beach leaving my impact visible in the sand and beds of weed.

The weed sandals, sandcastles and experiential survey show that play as a starting point for exploration tempers inhibitions. This modified inhibition allows us to look past some of the social risk involved with trying something creative. Curiosity leads us to attempting to understand how action and outcome relate, designing what best suits our understanding of the environment.

**Figure 22:** Examples of seaweed sandals generated by interacting with nature











## 5.6 Exploring the Local Park: Summary thoughts

Key insights from my exploration of *LOCAL PARK: Exploring further from home* that influenced my growing ideas about qualities of prototyping in nature are:

Loosening control when researching leads to **unexpected outcomes**. If I was only focusing on my survey instead of open exploration, I may never have conceived the seaweed sandal or the sandcastle barricade. This time spent perceiving nature in a new way allowed me to validate and challenge results from my experiential survey. The richest insights for Earthbond prototyping came from the spontaneous making of experiential prototypes, the sandcastles and sandals.

**Making with self-originating materials and phenomenon** uses natural materials, motion, time and natural phenomena to ideate and make. In this way nature becomes an active participant and our perceptions of nature can change. In the case of the Seaweed Sandals, and Sandcastle Barricade, my hands, sand, weed and water combined to generate an infinite number of ideas. This making was only limited by properties of which the materials afford. Making with nature and inviting playful engagement is a key aspect of Earthbond prototyping.

**Figure 23:** Mini sculpture made from found materials at local park





# EXPLORING THE UNFAMILIAR: Canoeing in the remote north

“The [Blackstone] river flows within the overlapping traditional territories of four First Nations: the Tr’ondek Hwech’in, Tetl’it Gwich’in, Vuntut Gwitchin and Nacho Nyak Dun. The Gwich’in name for the Blackstone River is Tth’oh zraii njik, which translates as “boulder-black-river.” (Peepre et al., 2008, p.174)

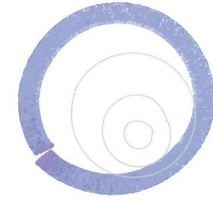
Figure 24: Descending a talus slope in the Olgovie Mountain range







## 6.0 EXPLORING THE UNFAMILIAR: Canoeing in the remote north



*“To travel by canoe is to ponder where we came from, where we are, where were going, who we were, who we are and who we can be.” (Iromoto, 2017)*

At the Apex of *The Nature Connection Pyramid* are unfamiliar places with surprising conditions. The Blackstone and Peel rivers met these criteria for my wife and me. Outfitting the river trip, like all the progressions within Ballentine’s pyramid, required moments of reflection, preparation and making. The following narrative laces the trip and the making of two of these prototypes together, a canoe skirt and a bug shelter vestibule.

The Peel watershed is one of a few remaining in North America that has no major development or resource extraction on any tributary. By canoe we travelled over 500km crossing the lands of the Tr’ondek Hwech’in, Tetl’it Gwich’in, Vuntut Gwitchin and Nacho Nyak Dun to reach Fort McPherson. For an eleven day stretch on a twenty day trip my wife and I perceived no signs of human life aside from our own: no footprints, plane condensation trails, old campfire pits or evidence of human impact. It was an opportunity to test the artifacts I had made for the trip but also full of opportunities to gain insight from being at the extremities of my world.

### 6.1 Animism

David Abram discusses in *Becoming Animal: An Earthly Cosmology* how settings can be palpable. The Peel watershed often made us gasp and step back with emotion (2011). Shadows moved with such speed across mountain faces that they seemed alive, or bursts of rain appeared out of nowhere catching us off guard. Even temperature constantly reminded us how dynamic natural phenomena are, ranging from a biting 2 degrees to a caressing 25 depending on the direction of the wind, time of day or topography. At this distance from other humans it is impossible not to accept just how alive everything you see is.

**Figure 25:** Spiral rock structures of Peel River Canyon, Peel River, Peel Watershed, Yukon Territory

The river itself becomes a feature to respect; sweeping branches reached out to trap us. Rapids move; forming and flattening depending on seasonal rainfall and flash flooding. Even rocks grumble as they grind and tumble down the bottom of the river. I came to enjoy the sound, amplified by the shape of our canoe. It reminded me of the sheer power of the water at all times.

*It's weird, you know, the way so many people accept the notion that stone is inanimate, that rock doesn't move' (Abram, 2011, p.55).*





We fell in love with the scenery and were concerned if our impact allowed travellers following us to feel the same sense of wonder. This animism, where “mountains, rocks, rivers, wind, water [are] preciously alive, and deserving of our respect, love, and compassion” (Bai, 2015, p.146) was much easier to understand when all of the distractions of day to day life in the urban world were stripped away. Animism is recognizing that the “whole universe is alive” (Bai, 2013, p.6) and full of intertwined relationships. This does not place nature as objects for manipulation and control, which happens often within design. For this reason objectifying any part of nature must be done with caution as it can lead to an abuse of relationships that are other than human.

**Figure 26:** Overloaded canoe covered by skirt





Often I pulled out my camera capturing a moment. Later the photos could trigger a memory for me, or be a pattern I could appropriate for design. I wonder how this rock would respond if it knew I was going to plaster its image all over social media and my thesis project. Would it be happy to have the exposure, bringing more people to share in its towering fragility? Or would it be upset that the influx of humans scared away its nesting peregrine falcons. We knew the thoughts of the falcons, they shrilled and swooped from the cliffs as we approached on the river.

*'We should be traveling into the wilderness and returning with stories that elicit curiosity. Stories that explain what we learnt from the terrain and nod to all the plants and animals and birds' (Snyder 2010, p. 24).*







## 6.2 Prototype - Canoe Skirt

The canoe skirt is a nylon cover that serves many purposes for canoe tripping (fig. 27). It protects us from flooding in turbulent water, traps loose gear in the event of capsize, supplies mounting points for a variety of safety equipment, and protects paddlers and equipment from the elements. I produced this piece out of new materials. In my mind I could not afford degraded materials. In this design situation I must accept the “new” alternative after examining the risk of the old. This ethical dilemma struck me as significant. Without a skirt I could still paddle the river but would be forced to approach rapids differently and rely on other artifacts to meet my needs.

## 6.3 Artifact as Mediator

The canoe skirt took on characteristics that supplied us with the opportunity to pay attention to our surroundings. It kept us warm from the wind; we even nestled into it while flowing downriver.

**Figure 27:** Original tent dismantled for the vestibule

The continuous motion through changing environments forced our senses to constantly adapt and it was the designed artifact that tempered the shock (fig. 29). The skirt and canoe became a part of us, acting as an extra pair of hands that stored and cared for equipment. The intent attention the skirt afforded came about through the close relationship between the artifact, the environment and us (Verbeek, 2005). The making and use of the canoe skirt nurtured this relationship.

*'This mediating role of things can become visible only if we do not reduce them to non-thingly aspects' (Verbeek, 2005, p.8).*

Reaching the point where we could attend to our surroundings came from significant effort and time spent making artifacts before this trip even began. The skirt and the following vestibule represent compounded skills from smaller experiments in studio (See *Appendix A*). These experiments included seeking ways to extend the lifespan of extremely worn equipment by repairing damage and using my own waste items as the building blocks to develop new ideas. I patched, sewed and even replaced the soles of boots with bike tires. All of this effort was to give objects that carried stories of my past trips one more chance to be used.

**Figure 28:** Napping in skirt on a dreary day





## 6.4 Prototype - Bug Shelter Vestibule

The vestibule is a lean-to tarp shelter with bug mesh walls (fig. 30). I made the vestibule from three pieces of damaged equipment, my first tent (fig. 28), a travel bug net and a silicone tarp riddled with scorch holes. In essence I stripped the old equipment of its primary function and form, but maintained a semblance of the earlier designed aesthetic and the value that I had seen in it. In my re-purposing I only rejuvenated parts of the original product to create the vestibule. Over time the components will degrade enough to join the offcuts in the trash.

*'The use of salvaged materials is not only resourceful; each material brings a speculative history and builds emotional durability into the narrative' (Hay, 2008, p.22).*

**Figure 29:** Vestibule set up on shore of Blackstone river





## 6.5 Curriculum of place

The vestibule became the first object we set up in camp and the last we took down. We sat in the separate enclosure away from the bugs, viewing the river or reflecting on our days travels. I wrote in my journal, ventured out to capture a couple photos or followed a curious thought. Once again, I was sitting on my front porch (fig. 31).

I found myself rearranging the vestibule into unique shapes, depending on the dominant wind direction or flat space available. I unintentionally generated design solutions based on how the environment interacted with the vestibule. I was making with nature.

Each stopping place supplied us with new curriculum. The vestibule played a part in this. It contained our footprint, acting as a familiar comfort site to learn and reflect on the subject matter each place had on offer. The campsites were teaching us what was “appropriate to do there” (Chambers, 2008, p.120), expecting us to watch our surroundings and build understanding. Sounds we created were muffled by the river and at other locations amplified by the cliffs surrounding us. Camping on sand meant a comfortable sleep and also told us that the river had reached that height recently, washing away the vegetation. Our campsite affected the traveling patterns of wildlife by more than just the physical space it inhabited but the smells, sounds and visuals it produced and left behind.

Each artifact we brought aided or disrupted access to this curriculum. Spending time listening to an iPod for example allowed us to remove ourselves from the space entirely. Binoculars showed us a close up look at flora and fauna we could not physically approach.

**Figure 30:** Vestibule set up in various configurations to meet wind, rain available space and mounting points.





## 6.6 Framing

*'A curriculum of place calls for a different sense of time' (Chambers, 2008, p.115).*

What we learn from the available curriculum in unfamiliar places becomes content for creative practice. This information projects forward to unfamiliar situations, redefining the range of variables that frame further inquiry within design. This ability to reflect on what we have experienced in order to challenge and take calculated risks is a learning outcome of both exploratory research and physical progressions to unfamiliar territory.

While making, preparing food, and collecting equipment I could only speculate on possible scenarios that we might find ourselves in. If our boat capsized would my emergency beacon survive the moisture, the impacts on rocks, and could I even find it floating in a brown or green river? These are variables that change the design which came from place based curriculum earlier in my life. The ability to see and define the framing of the problem is a skill of the designer and engineer. Preparing a progression into unfamiliar territory is practice in creating frames.

**Figure 31:** The majority of the equipment and food brought on the 20 day trip





This is why experiences in context are essential for practicing to recognize when the frame changes. My sleeping bag keeps me warm in the confines of a dry tent. The tent is part of what frames, defines the environment, of the design of the sleeping bag (fig. 33). If my sleeping bag design is too hot with too much insulation, do I redesign the bag, develop a portable solar powered fan, or just open the door of the tent. In this way new opportunities for design don't lie within a frame but beyond its edges. "People create the best solutions from the boundaries of their artifacts and environments" (Kim, H., & Lee, W., 2014, p.1). Each artifact we brought (and there were many) are solutions to a framed problem (fig. 32). No matter how perfect a solution there will always be another when the dynamic unpredictable nature of our world slightly shifts the frame. With practice it becomes easier to recognize how shifting a single frame, nudges the frames of everything it is in relationship with.

*'There are lessons tucked into the folds of so many little moments that we take for granted' (Bosley, 2017).*

**Figure 32:** Sleeping bag framed by tent



## 6.7 Exploring the Unfamiliar: Summary thoughts

I rarely stepped outside when making the vestibule and canoe skirt but my mind was situated in my past experiences outdoors while making. Imagining was facilitated through past experiences of connection, the material and the tools available to me. It was dynamic, ethically engaging and evolved with my skill in making.

Key insights from *Exploring the Unfamiliar: Canoeing in the Remote North* that influenced my growing ideas about qualities of prototyping in nature are:

**Progression is relative** to your understanding of the environment. Move away from spaces that are impervious to changes in climate and the influence of natural systems, creating enough distance to feel unfamiliar with the context. This can lead to a different understanding of framing. Most designers do not have the time or experience in outdoor education that I have. As a result I chose a very distant location for exploring the phase *UNFAMILIAR* of *The Nature Connection Pyramid*. For others, small progressions in making and reflecting are enough to spark our curiosity, teach us, allow us to challenge a fear and shape who we are.

**Intertwining with nature** is the act of listening to your ‘ecological self’. When developing a prototype, this can manifest as an internal debate about the design’s lifecycle, or the relevance of using repurposed or recyclable materials. It may be about how a design tempers adverse environmental conditions. In creating something that is maintenance free, experience-free, am I leading the user of the artifact toward a connection to nature or away from it?


**Attend to Nature** to build or deepen your relationship. Artifacts and actions that support acts of attending include: journaling, watching, drawing and being present through meditation. These all lead to connection with the natural world. This reflection on present experiences with nature builds a repertoire of memories and cultivates the ability to imagine artifacts in dynamic contexts.

**Figure 33:** Paddling in the current at the end of a 8km portage on Aberdeen Canyon Peel River









# SYNTHESIZING EARTHBOND PROTOTYPING

“Any part we may choose to focus on leads us beyond itself: a part is not understandable out of itself (as a discrete part), but only out of its context within the developmental process.” (Holdrege, 2013, p.77)

Figure 34: Mapping the research explorations in studio



FROM  
NATURE

REFLECT  
IN  
NATURE

FEEL  
NATURE

PO7  
LEARNING  
TO  
USE

EMPHASIS  
FOR  
NATURE

IDEA  
POOL

PE7S  
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- PERMANENT

NEEDING  
COGNITION

DIAGRAM  
RELATION  
OBJECTS  
TO  
REQUIREMENTS

LEAVE  
AT  
HOME

OBSERVATION  
OF  
ANIMALS  
PLANT  
DURING - HERE

TREE  
CLIMBING

SHARED  
STREET SCENES  
- MULTIPLE  
PERSPECTIVES  
THROUGH

THREADS

SCALE

TIME

PANORAMA  
VIEW

CONTROL

ZIPPER  
CONCEPT

GET DESIGN  
THINGS  
TO YOUR OWN  
MIND

GET DESIGN  
THINGS  
TO YOUR OWN  
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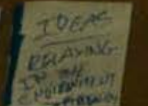
TEACHER  
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SHOTS  
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## 7.0 GENERAL CONCLUSIONS

This thesis explores three sets of Experiential Prototypes developed for three separate contexts: A gardening strategy for my *YARD*, an experiential survey at a *LOCAL PARK* and outfitting for a canoe trip in the *UNFAMILIAR*. The prototypes afforded many speculative uses but also exposed important relationships between “self-originating” nature (Bonnett, 2002) and design. Nature does more than just supply the material abundance to design, it inspires creativity and nurtures growth.

Ecologically dense environments demand full body attention, producing rich experiences that can be unpredictable, memorable, thought provoking and full of content for creativity. As contexts evolve, fundamental design skills present themselves, including: depth in observation, growth in tacit knowledge, resilience in adversity, speculation, planning, testing and problem framing. This learning by doing strengthens and builds neural networks that make ‘the entire body a tool for learning’ (Hanford, 1995). The smells of grass, the feel of pebbles on a shore, or observing the motion of water through touch and experimentation are all valuable lessons that translate into design’s way of knowing.

Earthbond prototyping is what facilitated this understanding. I found myself present in the environment letting new research opportunities emerge from simply taking the time to loosen control, observe and act. It was not until I reflected in mapping that I realized even I, someone with a strong link to ecology could find a way for my ‘ecological self’ to arise through designing. As discussed in section 1.2 the ecological self is an empathetic relationship with sentient or non-sentient others.

*‘Any part we may choose to focus on leads us beyond itself: a part is not understandable out of itself (as a discrete part), but only out of its context within the developmental process’ (Holdrege, 2013, p.77).*

**Figure 35:** Bear and wolf tracks dapple the shoreline of the Peel River



## 7.1 Mapping

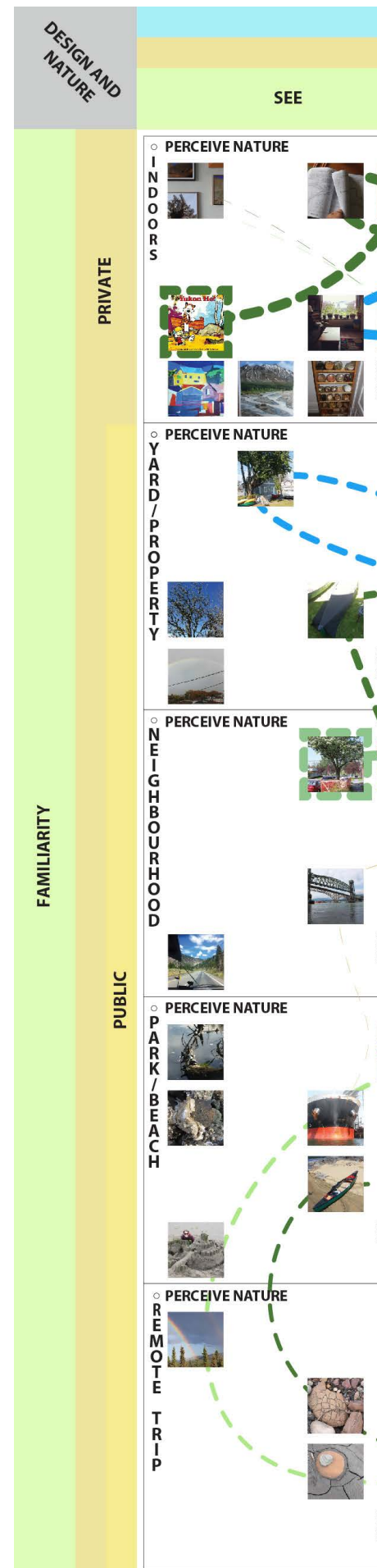
Mapping these research explorations deepened understanding of the process and highlighted many of the insights I have discussed in sections 4 to 6. *Appendix A - Catalogue of prototypes* details the inquiry that led to the making of each prototype. It was this catalogue and wide quantity of work that afforded iterations in mapping. Eventually the mapping technique that worked best to visualize and synthesize the work was a spreadsheet. There is some humour in this outcome as spreadsheets are a common computation tool I used throughout my engineering degree.

I was able to map photographs of the research paths on a grid that compared the familiar locations I progressed to: indoors, yard, neighbourhood, remote trip. This information set was compared to modes of experience: perceived nature, making for holistic engagement with nature, making with self originating materials and phenomenon, embracing unexpected outcomes from nature and attend on nature. I came to the realization that choosing one prototype to cap this work as a design outcome would be misguided.

Contemplating this map helped me to recognize that each contextual inquiry produced unique outcomes through a relatively consistent process. This repetition in process and the depth of understanding it produced shapes the Earthbond prototyping methodology.

*'One of the all-time most popular programming models is the spreadsheet. A spreadsheet is the dual of a conventional programming language -- a language shows all the code, but hides the data. A spreadsheet shows all the data, but hides the code. Some people believe that spreadsheets are popular because of their two-dimensional grid, but that's a minor factor. Spreadsheets rule because they show the data' (Victor, 2012).*

**Figure 36:** Refined process map showing the categorization of explorations and pathways



# EXPERIENCE

## THINK

### PLAY

### DO

	PLAY	DO	THINK
<b>INDOORS</b>	<b>MAKING FOR HOLISTIC ENGAGEMENT</b> Can I repair all the gear/clothes/hangs that are broken and unusable? What unique design methodologies emerge from prioritizing the experience of play about nature? Photos Collections Furniture Art Food	<b>MAKING WITH PHENOMENON</b> Can I repurpose gear/clothes/hangs that are broken and unusable? Is it repurposing if I don't actually use it? Sensory Cook Organize Make	<b>EMBRACING THE UNEXPECTED</b> Pets Mold Cleaning Proposition
<b>YARD/PROPERTY</b>	<b>MAKING FOR HOLISTIC ENGAGEMENT</b> Can I add function and aesthetics to a safety object? How did that change my perception of the object? Watch Growing Moving Peripherical Gardening Making Adhoc	<b>MAKING WITH PHENOMENON</b> Does the re-purposed object carry over value from the original object? Worlds Forts Objects	<b>ATTEND ON NATURE</b> How will letting my garden grow produce insights for my design process? Being
<b>NEIGHBOURHOOD</b>	<b>MAKING FOR HOLISTIC ENGAGEMENT</b> Can I create an object that provides a means to let your garden grow? Shop/Consume Public Art	<b>MAKING WITH PHENOMENON</b> How do private actions done privately differ from private actions done publicly? Can I use a poetic approach to design research to engage my intended audience? Curiosity Engagement	<b>EMBRACING THE UNEXPECTED</b> Spontaneous Understanding Sense
<b>PARK/BEACH</b>	<b>MAKING FOR HOLISTIC ENGAGEMENT</b> Time Relax Scale Sports Social Fear Eco-Phobia Contagious	<b>MAKING WITH PHENOMENON</b> What unique design methodologies emerge from prioritizing the experience of play about nature? Does a sensory play a role in my design process? Can I create an object to increase the time taken to interact with nature? Sand Castles Empathy Explore Imperative Agency	<b>ATTEND ON NATURE</b> Does the motion of nature create unique design possibilities? How can I produce spontaneous interactions with urban nature? Does human motion create design possibilities? Spontaneous Art Co-create
<b>REMOTE TRIP</b>	<b>MAKING FOR HOLISTIC ENGAGEMENT</b> Beauty Wilderness Unknown Pattern Safety Comfort Transform	<b>MAKING WITH PHENOMENON</b> Familiar Control Maelstrom	<b>ATTEND ON NATURE</b> Can I give people agency to navigate around the matrix to progress their own understanding? How do I translate learning in the wilderness to another scale? Knowledge Comfort Routine Acceptance



## 8.0 EARTHBOND PROTOTYPING

*'There is something on the other side of that high and difficult threshold, and those are high rewards' (Wood, 1999, p.7) .*

The explorations presented in this thesis were necessary to conceive the Earthbond Prototyping methodology. Of the artifacts presented in this work the Journal, the Seaweed Sandals, the Sand Castle Barricade and the Vestibule (fig. 38) can be defined as Earthbond Prototypes. At some point in the development process each of these prototypes resulted from “environmentally situated action” (Chambers, 2008, p.119) and reflection. Each produced interactions with the natural world that within my existing practice as an engineer I would have deemed impractical. The Journal, Sandcastle, Seaweed Sandal, and Vestibule were exploratory, generative and changed how I thought about nature’s influence on making and testing artifacts. Earthbond prototyping is a way to share this with other designers.

Earthbond Prototyping begins by defining an expanding contextual inquiry that places the research in familiar then unfamiliar natural settings. This process involves visualising future scenarios, autobiographical writing, and making Experience Prototypes to create active engagement. Once in context the designer must loosen their control to mitigate how much their expectations might influence any outcomes. This is by far the hardest part. Often throughout this work I found myself packing up prototypes determined to return to the studio and refine a detail that did not work. I wonder now how many more Earthbond Prototypes I would have developed if I had taken the time to deepen observations at these moments of frustration. As our mental awareness increases, we become immersed in the environment. Through this deep attention relationships with nature on the periphery of our previously defined concepts move to the forefront. It is only a matter of embracing these unexpected moments and turning them toward design. This allows natural materials and phenomenon to alter your perception and intertwine with design. Nature becomes a participant in shaping the designer and the design. Finally, take the time to reflect on deep attention, appreciate the ‘awe’ in the situation, impact on ecology and environment, recording it holistically.



The graphic representation in figure 39 shows how navigating expanding contexts through making, loosening, attending, and intertwining is non-linear, flexible and allows insights from explorations to percolate between contexts. This is necessary to benefit from the curriculum that arises and balances the rigid and linear mindset needed for a state of control.

Earthbond prototyping is a method for design research that shifts experience prototyping toward a bio-inclusive method of design. By focusing on the differences between making, the speculated use, active and unexpected engagement in natural dynamic contexts it is possible to change the way designers sense, feel, think, and ultimately act (Buchenau et al, 2000). The outcome is innovative in that it supports the ‘ecologic self’ of the designer, **leading toward an ethical stance on nature within sustainable practice.**

**Figure 37:** Sandcastle Barricade. Seaweed Sandal, Journal, Vestibule



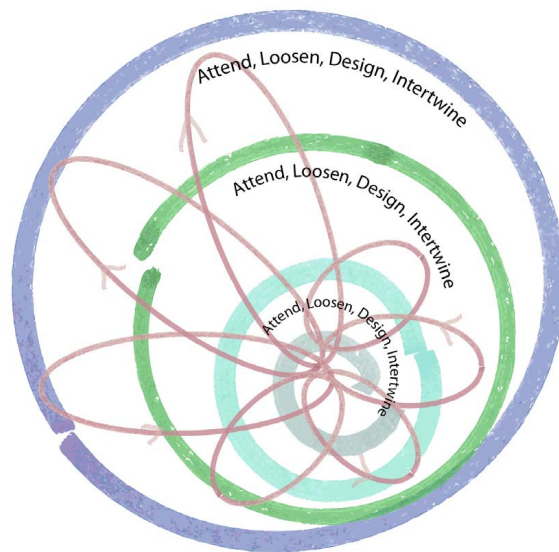
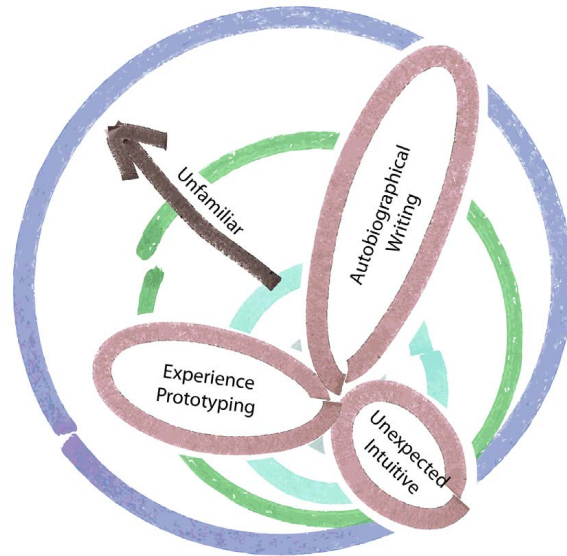
## 8.1 Characteristics of Earthbond Prototyping

- **Engage with nature** holistically. Invite understandings of sentient and non-sentient relationships through all senses.
- **Loosen control** by recognizing and inviting playful engagement. This reduces inhibitions and fear of risk.
- **Follow curiosity** to shift the frame.
- **Seek immersion** with information that is complex, non-linear and full of the unexpected.
- **Make with self-originating materials and phenomenon** to afford nature the time to be an active design participant. This exposes the dynamic relationship between artifact and environment.
- **Embrace and act on unexpected outcomes**; these are learning opportunities that develop ideas and content for creativity.
- **Attend to nature**; capture sense, feeling, thought and emotion to tap into the ‘curriculum of place’ (Chambers, 2008). This supports the emergence of the ‘ecological self’ through the relationships that are present.
- **Intertwine with nature** and listen to your ‘ecologic self’ when developing a design. Seek an understanding of the cost of design actions to ecology.
- **Recognize biophilia** in your design and its influence on designed outcomes and others.

Designers will discover “that it is through such active listening, and the surprising differences in perspective it reveals, that their own perspectives are activated, take shape and evolve” (Mathews, 2008, p.15).

*“...remember that I didn’t start out to paint a bird – the bird already existed. I started out to paint a picture of a bird, a picture which didn’t exist before I came along, a picture which gives me a chance to share with you my thoughts about the bird. Once you accept this seemingly simplistic but really quite profound premise, you will appreciate the many varied approaches to the making of pictures. “*

- Charley Harper



**Figure 38:** Earthbond Prototyping method diagrams



## 9.0 IMPLICATIONS

*‘are the qualities, depth, and extent of learning moving us towards or further away from ecological sustainability?’ (Sterling, 2001, p. 6)*

The personal and narrative tone of this thesis shares the breadth and depth of my journey to frame a methodology for connecting design and nature: Earthbond Prototyping. Earthbond Prototyping is an interdisciplinary methodology bridging and encompassing design and outdoor education. Both design and outdoor education include exploratory approaches to learning about relationships.

Exploratory approaches to understanding relationships are central to earthbond prototyping. By observing changes in nature over several months instead of a few days, we can learn to reflect with all senses; senses can be tuned and directed. Making with natural materials leads to understanding what material properties afford; the tensile strength in the seaweed is what shaped the shoes (p. 36). Speculative designs tested in context flush out unforeseen design considerations; the vestibule and canoe skirt (p. 48,43) were intended for shelter but evolved to become a narrative on comfort, connection and curriculum. Each exploration within the methodology of Earthbond Prototyping produced insights that led to a greater understanding of the benefits of immersing design practice with nature. The following are three examples of insights that could inspire other designers who engage with the Earthbond Methodology.

The blue bells in my yard grow from a dense base of long, narrow leaves. These leaves flop to the ground spreading out around the stem of the blue bell flower in about a thirty centimeter diameter. As the summer progresses, the blue bell flowers turn to seed pods and it is at this point where I noticed that the leaves serve at least two purposes. They gather energy for the seeds to form, but also wither and expose bare ground just before the seed pods burst. This ground would have been choked with grass if the leaves were not there to act as mulch. This leaves room for the seeds to land and germinate. Thousands of years of

evolved iteration produced a design that that capitalizes on opportunity while simultaneously producing opportunity.

In the park I spent time attending to sand worms. These somewhat prehistoric looking animals are abundant and move through the sand at incredible speeds. What I would call a ‘jaw-like shape’ extends outwards collecting a full mouth of sand, essentially boring and passing the sand through its own digestive tract. It collects and deposits nutrients on the move. Food for thought for any designer. How can the impact of our design movement benefit the community that we leave behind?

In the remote north I caught and ate Northern Grayling, an arctic fish with a stunning display of color on its dorsal fin. As we traveled downriver the vibrancy of color displayed on these fish diminished in correlation to the clarity of the water. I came to believe that in clear water predators can see all the way to bottom of the riverbed. Here, the grayling must camouflage themselves in the pebbles of red ochre, black basalt and green quartzite to stay hidden. In turbid waters this is not necessary, as the stirred up silt keeps the river brown and opaque. I relate this to how design decisions at the beginning of a process, upstream, may need reconsideration further into a process. When an environment changes designers must re-evaluate all of the decisions that led to that point, because design and environment are integrally linked.

Earthbond prototyping is a holistic technique that can change perspectives and prioritize an ethical relationship between design and nature. The concentrated immersion of Earthbond prototyping can lead to the understanding that we are part of the world, not just living on it (Mathews, 2008, p. 16). Over time, immersion in nature imprints an instinct for design that is nature centric. Our design work can embody and express the values of our ‘ecological selves’. As Heesoon Bai says, “Our actions in the world emanate from who we are: the way we think, perceive, sense and feel” (2012, p.312). When we think, perceive, sense and feel the natural world more deeply, we can change the way that we design.



## 10.0 FURTHER RESEARCH

There were many paths to follow when summarizing my generative and muddy research process (See Appendix A - *Catalogue of Prototypes*). An engineering lens may have concluded with an efficient and tangible outcome, or product. A strictly outdoor education lens would prioritize human relationships within nature without acknowledging design as integral to those relationships. I present the approach that is “appropriate to the situation’ (Sterling, 2001, p.82) recognizing outdoor immersion as a catalyst to deep learning, engineering and design along a spectrum of mindsets for control, and Earthbond prototyping as the link between them.

Earthbond prototyping is a mode that supports discovery and ethical innovation. As I’ve indicated in this writing, Earthbond prototypes are as much about their making as their use. As a design researcher I would like to see students navigate and use the characteristics of Earthbond prototyping in the same way I did. For most students, the progression to *YARD* takes them into unfamiliar situations with unexpected conditions. The shift to *LOCAL PARK*, would be even more so. What matters is intentionally taking the time to change contexts and approach a threshold that is not understood. This is navigating ambiguity. Finding deeper levels of understanding through this type of exploratory research not only builds confidence in Earthbond Prototyping, but in nature’s intrinsic value and nature’s contributions to wisdom, creativity, and design.

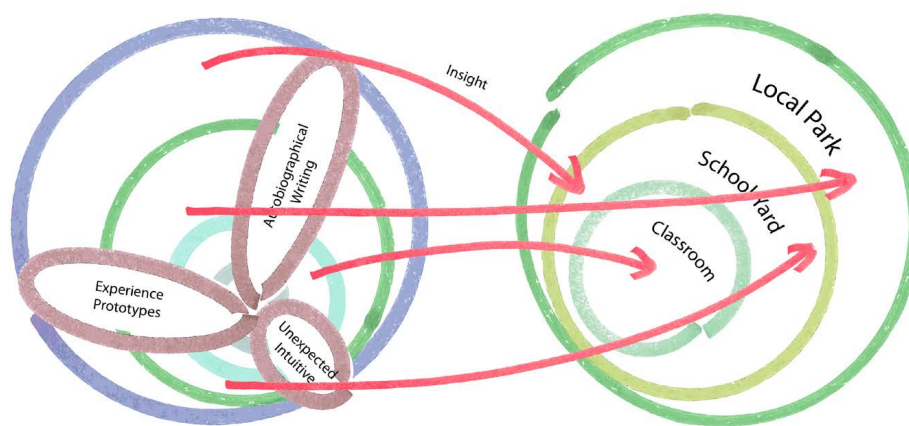
I have drafted two course outlines (Appendix C) shaped by this research and my previous experiences in Outdoor Education and Engineering. Both are techniques to teach Earthbond prototyping to second or third year design students. They would introduce students to a way of designing that can “shift their consciousness from the problematic industrial–military–consumeristic mindset to one that is ecological, holistic, compassionate and aligned with the earth” (Bai, 2012, p.312).

One outline describes a semester long studio course, and the second is a two week condensed course taking place during a sea kayaking

trip from False Creek to Granite Falls on Indian Arm. In both courses, students would develop techniques to capture heuristic data and build on its role in practice as a reflective and dissemination tool. They will explore and work with the characteristics of Earthbond prototyping as discussed in section 8.1. I am currently in the process of researching the steps to turn these rough course outlines into a course proposal and developing the details of each deliverable.

Earthbond Prototyping is inherently exploratory and generative, a method of design that allows designers to deliberately get lost in the woods, whether it is following a new stream or climbing an old tree. Placing themselves in situations where discovering conceptual and physical terrain is rich with opportunities.

Additionally, I would like to continue to research or refine many of the prototypes found in Appendix A. I have already begun to use the Earthbond structure to develop artifacts for a K-1 classroom. These are a series of play stations that act as landmarks to move the primary classroom into outdoor contexts (fig. 41). I have also explored using the characteristics of Earthbond prototyping to develop a legacy workshop to create public art. These explorations can be found in the catalogue of prototypes (Appendix A).



**Figure 39:** Applying the structure and insights from Earthbond Prototyping to the primary classroom stations





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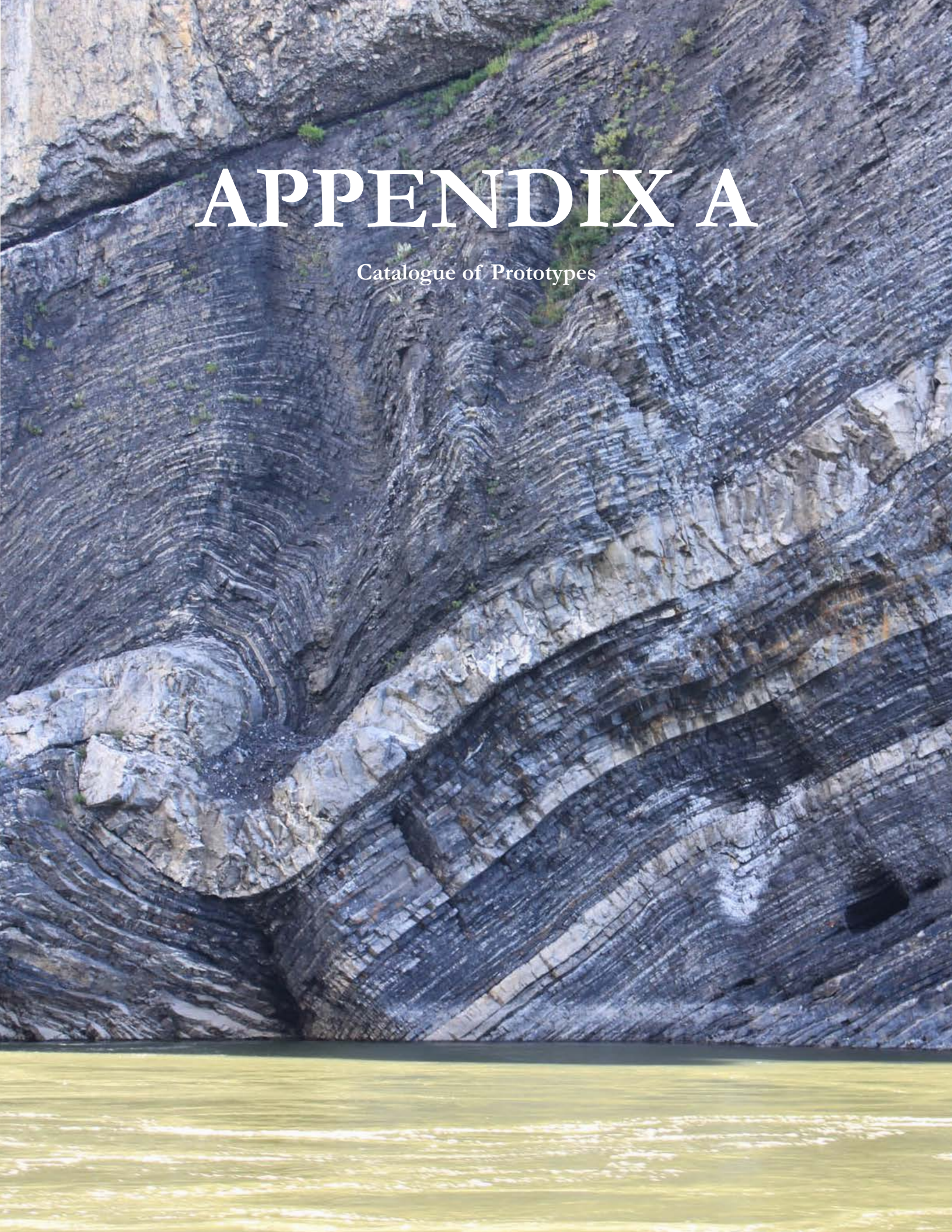






# APPENDIX A

Catalogue of Prototypes

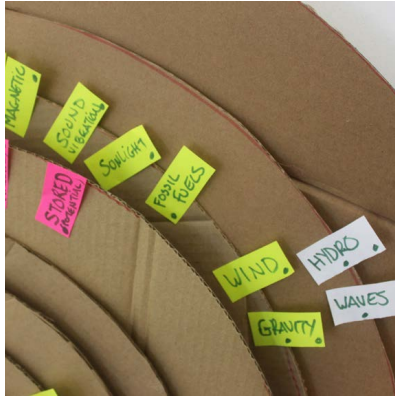




# -31

## Wheel of Thoughts

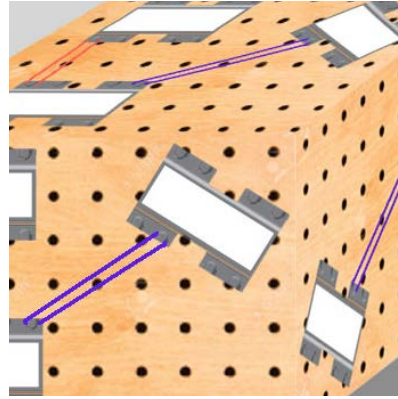
How can thoughts be randomized to produce shifts and insight?



# -30

## 3D Thoughts

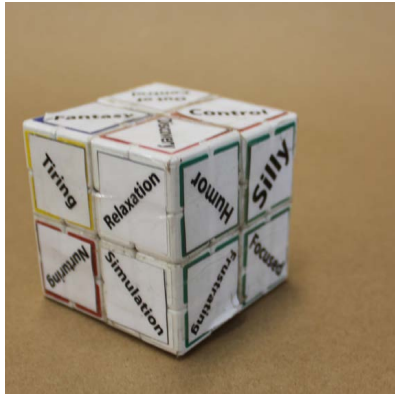
Can Post-it notes be used on 3D structures to mind map?



# -29

## Sensory Cube

Can adjectives be randomized to help people observe differently?



# -28

## Learning Style Stamp

Can Gardner's intelligences be used to evaluate areas for improvement?



# -27

## Intelligence Spectrum

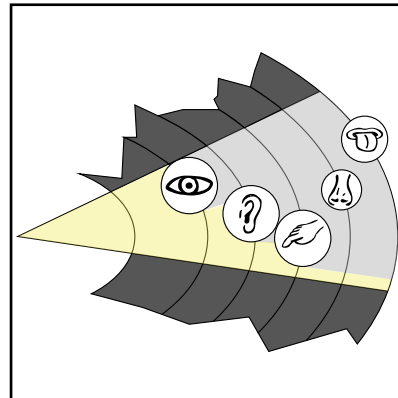
Can intelligences be represented by a spectrum?



# -26

## Sensory Eclipse

How can I share multi-sensory experience and show how we preference senses?



# -25

## Multi-Sensory Mask

Can I have fun in the studio and make people think I am working?



# -24

## Sensory Glove

Can textures on a glove be associated to memory of tasks?



**-23**

## *Fidget Board*

Can augmentative fidget toys be customizable or modular?



**-22**

## *Fidget Desk*

Could the underside of a desk be a canvas to 'fill' with fidget tools?



**-21**

## *Alley Shopping*

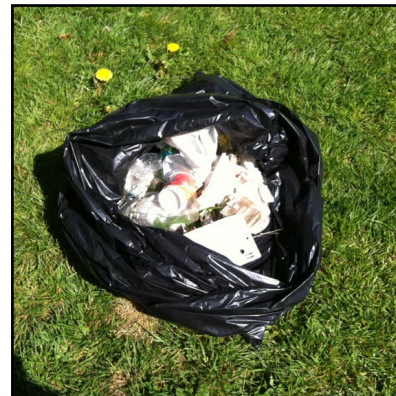
## What insight present from completing a photo study of alley waste?



**-20**

## Garbage Collection

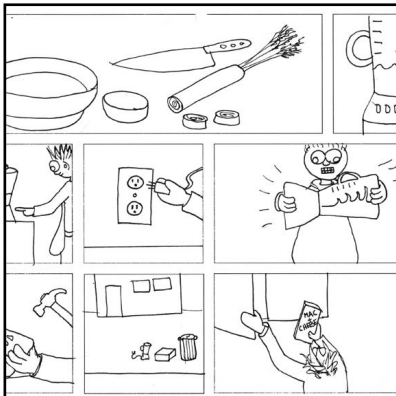
Will cleaning up all the garbage on my street produce ideas?



**-19**

## Wasted Stories

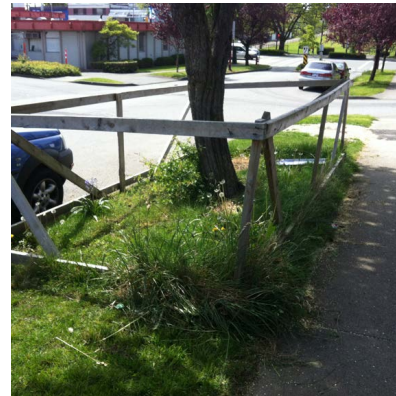
## Can storyboarding be used to share design insights?



**-18**

### De-Fencing

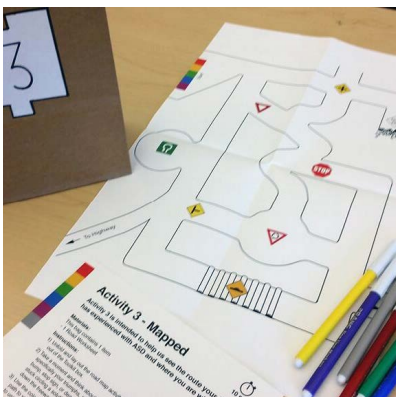
Will removing fencing make it less likely people will use the tree barricades as trash bins?



**-17**

## Autism Co-creation

What symbolism will be most effective to draw out conversations on autism?



**-16**

### Ideation Scroll

Will forcing a linear process still be linear?

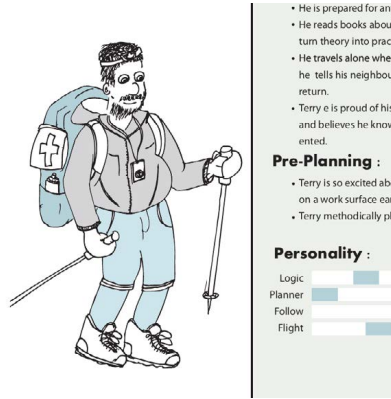




-15

## North Shore Hiking Persona's

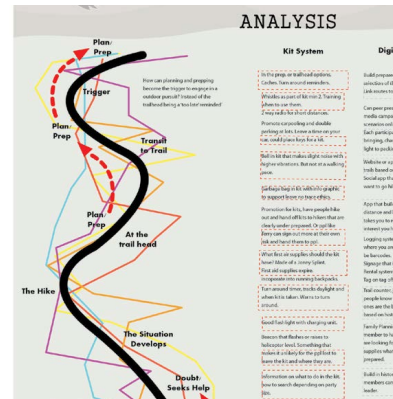
Can I research personas for hikers on trails adjacent to urban centres?



-14

## North Shore Journey Mapping

What would the most effective intervention be to promote safety for all personas?



-13

## North Shore Preparedness Kit

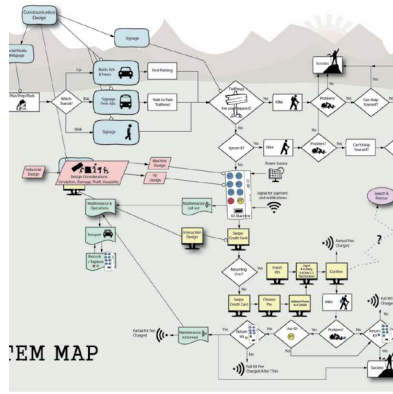
What are the essential items every hiker should carry?



-12

## Preparedness Kit System Mapping

Could I imagine a service of kits to ensure hikers always carry essentials?



-11

## Exploring

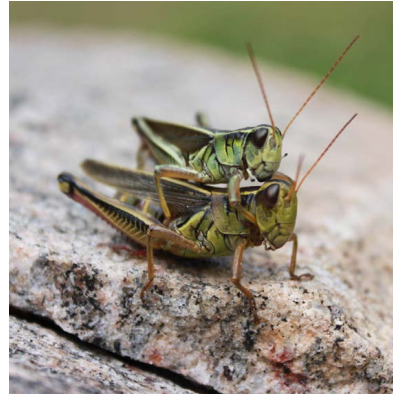
How will observing kids connect to nature create insights?



-1

## Scale Shift

Is capturing insight with photography effective dissemination?



-9

## Caving

What unique design methodologies emerge from prioritizing the experience of play in nature?



-8

## Camping

How will observing kids connect to nature in dense ecology create insights?



## Old Mans Beard

## Hiking Grind

## Imaginary Tree Forts

## Mapping Motion

## Super Glasses

## Explore Urban Crevices

## **Ankle Cuffs**

## Journal Template

[illegible]



1

## Recruitment Poster

How do I recruit participants?



2

## White Board Questionnaire.

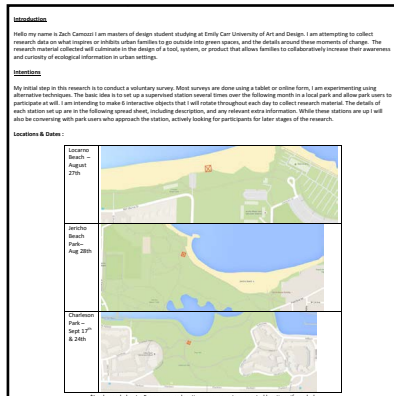
Can I engage the public with my questions?



3

## Scavenger Hunt

Can I use a ludic approach to design research to engage my intended audience?



4

## Fear Box

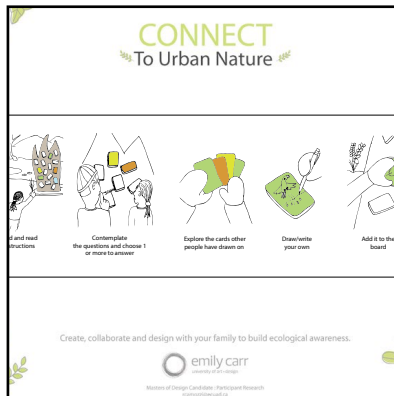
How can the materiality of an artifact change our desire to interact?



5

## Instructions

Are instructions a sign of poorly afforded designs?



6

## Perspective Board

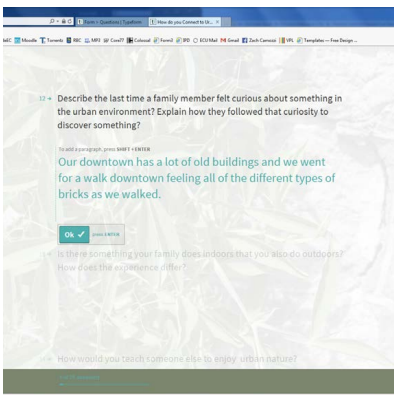
Can I show changes in perspective in a question?



7

## Online Survey

Will a survey play a role in my design process?



8

## Directional Choice Signs

Can I come up with unique ways to gather survey data?



9

## Play in Nature, Sand Castle #1

How do non-complimentary behaviors produce interactions?



10

## Tent Tarp V1

Can I test my artifacts while doing my survey?



11

## Sand Castle # 2

Can kids even wait for the tide?



12

## Seaweed Sandals

Does the motion of nature create unique design possibilities?



13

## Shovel Tossing

Does human motion create design possibilities?



14

## Supervisor

How Does stopping and being in the moment change perspective?



15

## Sand Castle Barricades

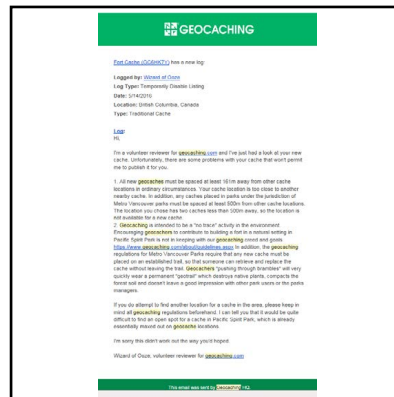
Can I produce an object to increase the time taken to interact with nature?



16

## Fort Cache

Can I get an existing community to build together outside of what they find familiar?





# 17

## *Seedlings*

How is Gardening connecting?



# 18

## *Wet 'Moisture'*

Can designing with nature make people understand multi sensory design?



# 19

## *Hedge Sculpting*

How can I produce spontaneous interactions with urban nature?



# 20

## *Interaction-Less Gardening*

How will letting my garden grow produce insights for my design process?



# 21

## *Mini World*

How can I produce spontaneous interactions with urban nature?



# 22

## *Seed Cache*

Can I create objects that promote making time to 'let your garden grow'?



# 23

## *Garlic Braiding*

What other actions within gardening produce connections to nature?



# 24

## *Mint 'Smell'*

What is private/public? How do private actions done privately differ from private actions done publicly?



# 25

## *Fern Game Board*

How can I explore Bio-mimicry.



# 26

## *Tree Fort & Board Game*

How does collaboration effect myself as a designer?



# 27

## *Concrete Yogurt Parfait*

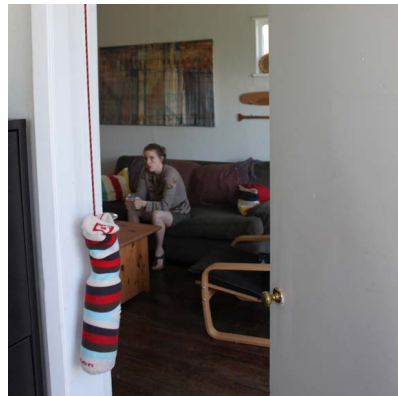
What is the difference between art and design?



# 28

## *Water bottle Door Closer*

What sustainable artifacts do I already have at my house?



# 29

## *You Tube Stools*

How does collaboration effect my design strategies?



# 30

## *Bear 'Bell'*

What is critical design?



# 31

## *Mush Board*

How can I map ideas in an alternative way?



# 32

## *Modern Pet Rock*

Can I make artifacts that are critical design?





# 33

## *Zipper Repair 1*

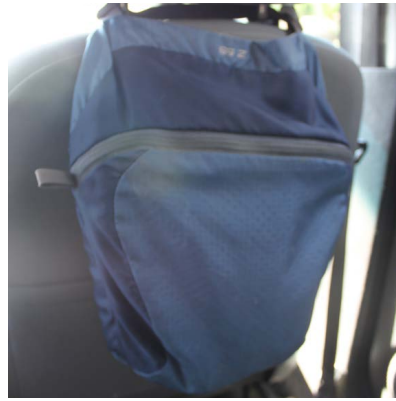
Can I repair all the gear/  
clothes/things that are  
broken in my home?



# 34

## *Re-Purpose Bag Hood*

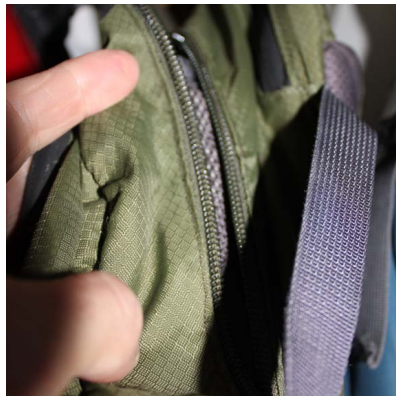
Can I re-purpose gear  
into something else I  
find useful? Adhocism?



# 35

## *Zipper Repair 2*

How does this change what  
I need to find for our trip?



# 36

## *Headlamp Repair*

How does it change how I  
think about what I can get?



# 37

## *Birk Repair*

What else can I fix?



# 38

## *Workstation*

How does the environment  
need to change to allow  
design to happen?



# 39

## *Bogg Repair*

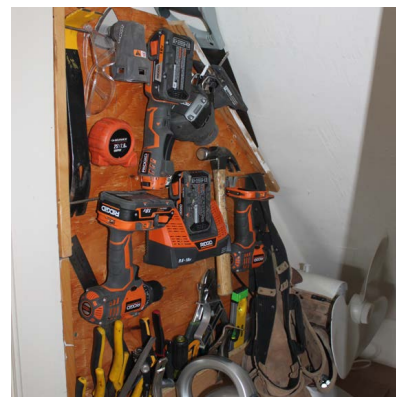
How long does it need  
to stay fixed for?



# 40

## *Organize Tools*

How do tools/hard  
skills change my  
ability to design?



# 41

## *Fruit Leather*

Is food preservation design?



# 42

## *Quick Access Kits*

How can we access equipment that is sensitive to weather?



# 43

## *Drying Vegetables and Jerky*

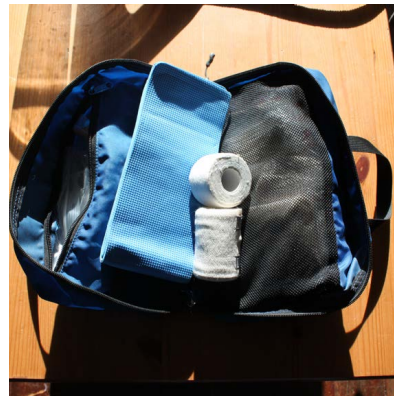
What else can I prepare for our trip?



# 44

## *Emergency First Aid Kit*

What is essential for repairing ourselves?



# 45

## *Waxed Cheese*

How else can I delay the decomposition of food?



# 46

## *Emergency Repair Kit*

What is essential for repairing our equipment?



# 47

## *Meal Packing*

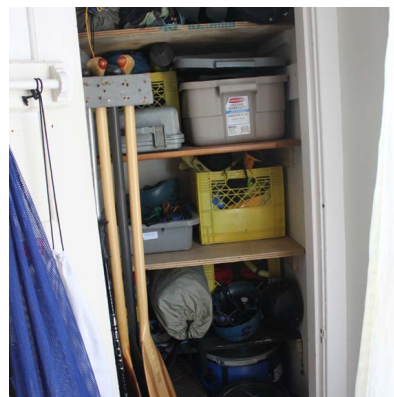
How much do we need for 20 days?



# 48

## *Closet Outfitter*

Where can I keep all this 'stuff' I have made?





# 49

## Map Book

How does having a map change the experience?



# 50

## Paddle Repair

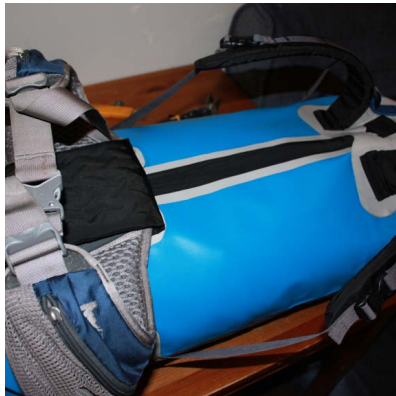
Which shape/material of paddle should we bring?



# 51

## Re-Purpose Dry Bag

How sustainable is re-purpose old equipment?



# 52

## Throw Bag Harness #1

How can improve on the existing design?



# 53

## Boat Outfitting

How it is done now? What am I missing that lead to contemporary choices in outfitting?



# 54

## Canoe Yoke Pads

What types of padding are most comfortable?



# 55

## Repair Float Bag

Is scabbing materials design?



# 56

## Rescue Leash

What else can I reverse engineer?



# 57

## Throw Bags 1

Do safety devices feel less safe when made by your own hand?



# 58

## Boat Selection

What shape of canoe is more appropriate for the type of paddling and load?



# 59

## Throw Bag 2

Can I add function or aesthetic to a safety object?



# 60

## Knee Pads

How can I make this experience even more comfortable?



# 61

## Throw Bag 3

How did that change my perception of the object?



# 62

## Canoe Skirt

How does making with new materials change how I make?



# 63

## Water Bag

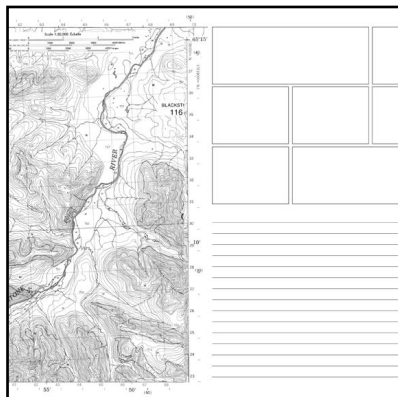
What happens when you get too much momentum and just try making everything?



# 64

## Map Journal

Is planning a form of 'mental visualization' for a successful experience?





65

### Tent Floor Tarp

Does the re purposed object carry over value from the original object?



66

### Pre-Trip Test

Will my equipment work the way I expected?



67

### Vestibule (Front Porch)

What equipment can I disassemble to build new designs?



68

### Coffee Meditation

How do I translate learning in the wilderness to another scale?



69

### Roof Rack

What can I scavenge to build a roof rack?



70

### Canoe Skirt Hammock

What designs emerge from using in context?



71

### Trip Organizing

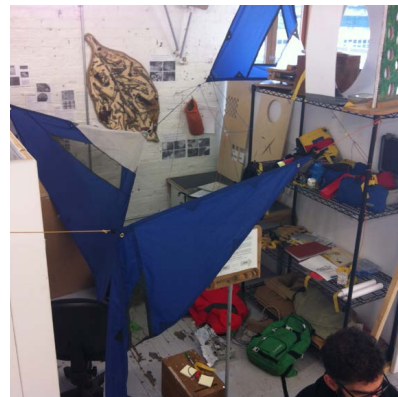
What design methods do I use in preparation for a trip?



72

### Open Studio

Will my heuristic methods be understood when presented to the design community?





# 73

## Barriers

How is design working with barriers and thresholds?



# 74

## Would You Rather Poster 1-6

How political is this work? Is it a campaign?

# 75

## Little Community Book

How can I share community journeys in a way that can be analog and filterable?



# 76

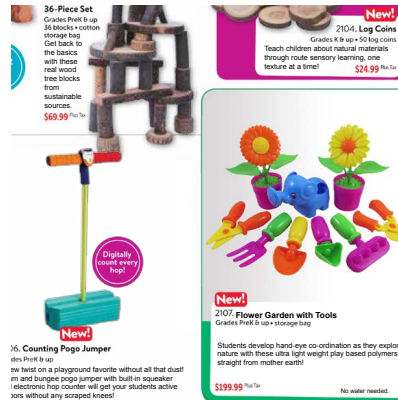
## Instructions

Will collaborative instruction making with a 6 year old produce unique outcomes?

# 77

## Scholashtic

Is there a trend in education ignoring the benefits to outdoor immersion?



# 78

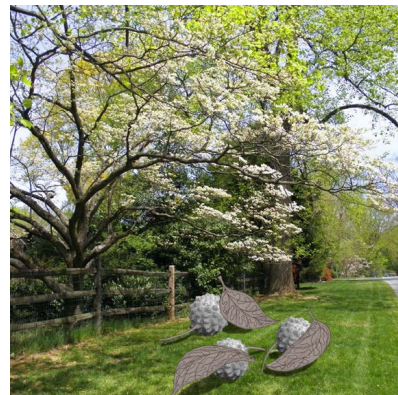
## Community Art

Should my methods manifest as community engagement projects?

# 79

## Kids Book

Can I share my design process in the form of a children's book?



# 80

## Community Sculpture

Could this culminate in public art?



# 81

## Mapping 1

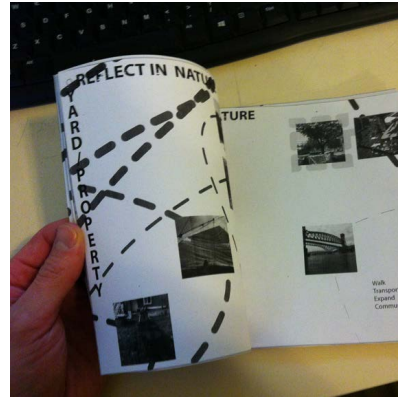
How do I synthesize all this work?



# 82

## Mapped Book

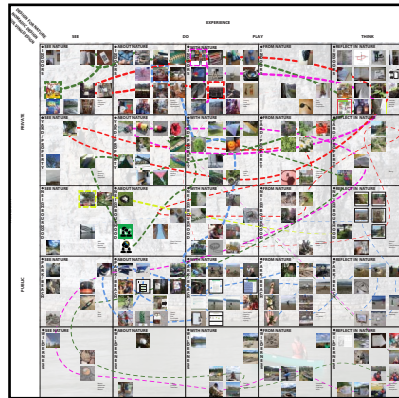
Do I need to simplify it and make it more accessible?  
What do I lose?



# 83

## Mapping 2

Or should it be complex forcing the user to navigate?



# 84

## House Station

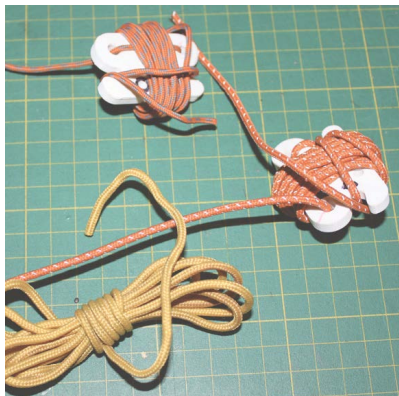
What can be done to progressively expand in the K1 classroom?



# 85

## Guy Line Cleat

What new designs emerge?



# 86

## Transportation Station

How abstract is too abstract, to separated?



# 87

## Cook Station

Can I apply the methodology to a narrower problem space?



# 88

## Shelter Station

How do earlier prototypes play into current prototypes?



Designing for statics produces static designers,  
threatening our dynamic reality.







# APPENDIX B

## Survey Results

something free  
and beautiful  
that hasn't been  
conquered

nature is a  
place where  
plants can  
grow, animals  
have homes,  
and people can



## Appendix B - Responses to Experience Survey

### 1. Our family unit consists of \_\_\_\_\_ adults and \_\_\_\_\_ kids.

2,1 2, 2 2,1 2, 3 2,2 1,1 2, 1 1

### 2. My children's ages are .....

2.5 4,6 5, 8 3 months 1, 3, 6 <1,2 3

### 3. How many times a week (or month depending on your needs) does your family experience the outdoors together?

Every Day  
Every Day  
Twice a week  
Every Day  
Every Day  
Every Day  
Twice a week  
Twice a week  
Twice a week

### 4. Describe unique outdoor activities that your family participates in together?

mud kitchens, forts, sandcastles, edible wilds, creak boat  
Walks, ride a bike, swim at outdoor pool, badminton  
Hikes, walks

Gardening, biking, walks, yard work, swimming, Fort building, soccer, catch, using the hose or watering can, chickadee watching, worm hunting, rock collecting, stick swinging, poking and stacking  
Zoo, playground, walk to the library,

play in the backyard, camp, hike, splash parks.

Go to the Beach and have a small meditation activity then we play

Walks, learning about nature adventures, walks, canoeing, cycling

### 5. Describe your family's most memorable outdoor experience?

broughton archipelago paddling with killer whales

Walk the trails together at Deer Lake park, they go all the way around the lake, seeing the many animals that exist and just seeing flowers, rocks, leaves, bugs, etc.

Hiking the trails near our home. Our son calms down instantly when we are near running water in the creek near our home.

Seeing two moose in a lake grazing (not urban). Doing grouse grind together (urban)

Going down to the river to throw rocks.

In the park all together playing frisbee  
Holidays outside the city! Trips to the mountains, sailing, skiing  
hard to, time in the mountains in tibet probably

### 6. What is each family members favorite things to see in urban nature?

eagles

Kids love collecting things (rocks, leaves, petals, flowers), I love seeing the

ducks, geese, cranes in harmony. My husband likes the peace and quiet that the trails, nature bring.  
 Trees, turtles, natural light  
 Worms, dogs, French peas, birds that are not crows, sunsets  
 Worms(2), birds(dad), bunnies(mom), leaves(<1)  
 Mountains and water  
 Maman: sunsets; Mum: fountains;  
 kiddo: don't know yet!  
 not sure

**7. What is each family member's favourite thing to touch when exploring urban nature? What do they associate with that touch?**

black berries, ocean water  
 Husband is soft grass, brings peace. I love to touch bark on trees, it's just so unique and nothing else is like it, kids love that too! Girls also love to touch rocks, because there are so many types, feels, sizes.  
 Rocks, leafs from trees as you walk by, our infant enjoyed laying in moss  
 Blackberries - yum, moss - like a duvet, smooth rocks - treasure, sticks with girth - magic/power  
 Picking strawberries, smell of fresh rain, inside, crushing flowers.  
 Hug trees we associate it to life, oxygen and smelling flowers  
 Maman: long grass as I walk past;  
 Mum: trees; kiddo: we'll see!  
 the trees

**8. Describe a memorable sound from time spent immersed in nature and the story that**

**makes you remember it.**

robins, my parents house  
 Going to the beach and hearing the waves crashing on the shores. It reminds me of the time I was a child and we went in camping in Portugal and waking up every morning for a week to those sounds  
 The birds singing in the backyard this spring while sitting outside as a family, it felt like the sounds represented the new beginning of Spring and our new family  
 The loon call... Lots of stories, trying to get close to a loon in a boat.  
 Guessing where loon will surface  
 Rain on a tent.  
 The sound of the birds and bugs also the sound of the sea  
 Waterfalls crashing and bell birds singing at the same time; on a bushwalk in Australia  
 always the wind

**9. What is Urban Nature?**

where wild animals and plant species live amongst human development  
 Nature trails and nature systems that exist within an urban environment (ie, we have this outside our door in Bby, where a lake and trails and animals exist outside your door.  
 Natural green space with trees and trails  
 the natural in and around the built environment  
 Parks, pathways, backyard, attractions/facility, wild life within city limits.  
 Majestic nature that seems bigger than humans and whatever we create.



It depends on the city. In Sydney, there are swathes of almost untouched bushland preserved within the city limits. In New York, any park/garden with green space. curated experiences that contrast the urban concrete megalith that is life in the city.

**10. What motivates each family member to spend time outside?**

mainly that we both really enjoy each other and being active. Social time brings us outdoors and we both go crazy inside.  
a break from technology, mental health  
In Vancouver it's so rainy and gloomy most of the year, and so whenever there is warmth and sun, there is no way you will find us locked inside.  
Fitness, stress reduction and positive emotional outcomes  
Mental health, exercise , family time, creative play, spiritual connection  
Fear of couch potatoe, availability and ease of parks/bike paths within 1 km.  
Urban shops within a km, grocery stores, restaurants, etc.  
To breath fresh air and admire nature  
Wanting to keep healthy & fit; enjoying the feeling of refreshment in green space; having nice weather; feeling cooped up inside - the feeling of space a break

**11. Describe the last time a family member felt curious about something in the urban environment? Explain how they followed that curiosity to**

**discover something?**

walking home today, Fynn was interested in the birds. We stopped and listened to them for a while until he was ready to go.  
watching mason bees  
There are a lot of different animals habitats along the trails near our home. Many times we will we walking around the lake or near the shores and the kids will see an animal/bird that they have never seen and will ask lots of questions. My husband knows a lot about birds, so he can answer those. As for walking the trails, you sometimes hear creatures running through the bushes and that gets kids curious about those creatures and usually they jump at the chance to find these creatures. Our downtown has a lot of old building and we went for a walk downtown feeling all of the different types of brick as we walked  
Baby chickadees... Hearing them.  
Wondering what they eat. Watching mom and dad chickadee deliver insects  
2 year old saw worms after a rain and wanted to save them (by collecting them on the grass)  
Looking at a dead bee my son was curious about it, also so to see ants work together  
Just recently on a trip to the mountains we wanted to find out more - we ended up taking a geology tour & learning a lot about how the mountains were formed, different types of rocks etc.  
not sure

**12. Is there something your family does indoors that you also do outdoors? How does the experience differ?**

we have no boundaries :-)  
building towers with blocks-  
building forts, outdoor play is more  
impermanent AND memorable  
Nope. Two separate dimensions.  
Playing cards, watching movies,  
reading, very different  
Socialize. We are more active when we  
are outdoors  
Eat. More fun when sunny . Messier  
Chalk drawings, easier inside (less clean  
up/distractions). Eating, more relaxed  
outside (picnic by a park, child free to  
roam)  
Yes, playing with the ball. It's less  
restrictive when we play outdoors

**13. How would you teach someone else to enjoy urban nature?**

not make them feel judged for being  
more scared/not liking something. Let  
them see us having fun and approach it  
their own way. Show them the greater  
possibilities of what the natural world  
offers without being preachy.  
i would teach them the difference  
between shitty rain gear and good  
gear, i would teach them to layer, bring  
snacks and prepare to get dirty.  
Tell them to notice how nature affects  
your senses, how it affects your  
eyesight, what do u see, what sounds  
do u hear, what do u smell, what do  
you feel, how does this all connect to  
your deep insides

Ask them to join on our family walk,  
Introduce them to fun recreational  
activities they can do outdoors  
No teaching just take them with  
to a nice spot ... Maybe point out  
something of interest like a large  
stump of old tree with smaller trees  
growing from it  
Go to the zoo, take them for a walk  
along the river to a good coffee shop.  
To admire it is to be present. I'd say it's  
bigger then us and far more beautiful  
I'd encourage them to look around,  
experience new sights/sounds/smells,  
observe birds, flowers & animals, play  
sports or games

**14. Describe a moment outside together you wish you could forget, what made it so hard?**

We spend so much time outside...it's  
hard to say the most memorable. But  
the most recent, impactful was the  
tour de nuit. We spent 2 hours riding  
with other people at night. Fynn was  
cheering and high-fiving and laughing.  
He loved it so much he refused to  
sleep.  
getting flooded while camping with  
teenagers, everything was soaked, our  
sleeping bags, clothes everything. We  
knew if it wasn't completely hot and  
sunny we would have to be evacuated.  
The time we went for a family  
photoshoot along a popular trail.  
Littlest child was 2 and decided to  
run off, the more we ran after her,  
the faster she ran, she kept looking  
back and in doing so, tripped over an  
embankment sliding head first into



a pile of gravel pit. There was blood everywhere. We were in the middle of a photoshoot (5 min. In) and nothing to wipe up her face. Needless to say, everyone was covered in blood. Her face was disfigured for a long time. All good now!

Portaging on an extremely buggy trail, the bugs were unbearable and bug bites were painful

Camping with dogs. One dog whined all night. I could feel him staring at me through a tent and I did not sleep

Hiking and being caught in a hail storm with child (lots of screaming took several months to untraumatize child).

Seeing animals starving and being abused. It makes me feel useless furious

**15. What stops your family from going outside together? What limitations does your family face when experiencing urban nature?**

sickness, life commitments like work and school (but generally playing outside takes priority over those) -40 weather conditions.

laziness, exhaustion, transition time actually getting out the door.

The weather. We like warmth. If it is wet and cold, we don't like to get outside as much

Bugs in the evening, coordinating all family members schedules

Lack of shade, unexpected cold or wet. Staying warm or cool, plenty of food and snacks

Weather, time, crowds, cost.

Big hikes. My sense of location is not good and I'm afraid of getting lost.

Also bears

Weather (extreme cold, heat or rain) and in winter, limited daylight time

**16. What does your family do to overcome the difficulties/ limitations to getting outside?**

bribery

It's tough. Not much

Choose alternate times to get outdoors and be spontaneous instead of planning walks

Prepare food and snacks, appropriate gear and clothing, change our attitude!

Invite friends

Annual memberships, good clothes.

We go outside and the limitations just don't exist... We just do what we feel we can do and is accessible for us

We get out whenever we can - even if just for a short while! Or we explore museums, or watch nature documentaries

**17. What makes you the most anxious or scared about your family exploring nature in the urban setting that is directly related to society?**

mainly garbage, glass, needles, used condoms...

dog poo

Not knowing how certain animals will react, especially to children

Being isolated from people

Running in forest alone - creepy people. Busy roads and cars - bad drivers

Cars, heavy traffic, huge crowds,  
pesticides.

Bears

It's not very clean! I worry about the  
possibility of picking up bugs (a friend  
once got scabies from Central Park!)

**18. What in nature makes you the  
most anxious or scared about  
your family exploring in  
the urban setting that is  
directly related to nature??**

dog poo

How will certain animals react to  
humans.

Bears

Trees or large branches falling, bears,  
kids eating weird mushrooms

Ticks. Bears

In Australia - the poisonous animals!  
In New York, no worries.

**19. If you could build the perfect  
green space close to your  
home what would it include to  
ensure you could benefit from  
the natural environment?**

shade, trees, plants, running water,  
interesting animals(a refuge for them)  
people that took care/respected the  
place, sound barriers for noise from  
traffic, natural play structures for kids,  
a pond with technological view finders,  
ways to explore underwater with  
cameras... an adventure playground  
where kids could have enough  
materials to build forts, a manipulative  
stream to build really cool dams, that  
recycled water... a composter that kids  
could watch the stages, within the park

screens that broadcasted live eagle  
nests, wolf dens, bee hives...

Different types of trees and plants,  
walkways, ponds, dock with boats, row  
boats, paddle boats

Water specifically areas where you  
could dip net and get really close to the  
edge to explore what is in the water,  
large trees with lots of shade and  
variety of trees, lots of tactile things  
like rocks and plants, trails to walk on.  
Chickadee house, French pea and  
blackberry garden, comfy dog beds  
and dog water, lots of smooth rocks,  
a bubbling stream, a nice area to sit ,  
large boulders, trees and shade, trees  
with sturdy branches and rope swings  
Park, swimmable lake, path around, lots  
of shade (forested area), coffee shop  
on far side that sells ice cream.

A big mountain and some orange trees  
Plenty of walking/biking trails & water  
features (streams, lakes), trees/forested  
areas, play spaces (treehouses, ziplines)  
& learning spaces, places to play sports  
and meditative places to relax

**20. What animal would you want to  
see in the urban setting? How  
would you ensure that animal lives  
comfortably in an urban setting?**

Elephant, I can imagine it not in  
canada but another country...with a  
whole slew of animals.

beavers, deer, rabbits, salamanders,  
salmon, frogs, toads, otters, turtles  
(already at granville island) big parks,  
viewing platforms that allowed for  
privacy, telescopes, or whatever, park  
rangers actually fining people for litter



and NO damn dogs aloud.

----We love different types of birds.

Ducks, cranes, geese, hummingbirds, herons

A variety of bird species and a meadow for butterflies

Fish and frogs. Keep water clean.

Chickens with bylaws to protect animals. Weed control goats in parks (electric to keep goats within bounds).

Horses. To have them in a protected farm

Birds of all types! I think birds are best suited to live in urban settings - lots of trees, water & space keeps them happy!

## **21. What other animals would your animal attract?**

----Crows, seagulls

Larger birds

Birds, coyotes, people, raccoons,

Mice, coyotes.

Ponies ?

## **22. If you could build/ grow anything in your backyard what would it do? How would you interact with it?**

berries, vegetables, bee hives, basically everything...

Birdhouses, hummingbird feeders, sit and watch them of course.

White pines we would do bark rubbings, picnic under it, play tag around it, forest for Fort building and nature games

Large tree that provided shade, fruit, nice flowers, bird and bee houses, sturdy branches for climbing and

swinging

Massive garden for the kids, chicken coop, jungle gym (lots of slides and climbing), orchard.

I grow tomatoes, pies, chilliest and herbs and I look after them in a very rustic way.. I don't buy fancy stuff and they just accommodate to my style  
I don't have a backyard, but if I did, I'd love to have a veggie garden!

## **23. Is there is anything else you would like to add**

bike lanes, more boardwalks, more non-tacky playgrounds, adventure playgrounds, low ropes, elements that encouraged safe tree climbing, meadows with walkways through them, sand pits, water play elements, urban farms, urban bee hives...

"Good Luck!

That was fun."

We love getting out family outdoors, such a great focus for your masters!

Our dogs like urban nature ... they connect us to it everyday. What about pet connection to urban nature?

## White Board Quotes from Spanish Banks

**What about this park do you enjoy that is not within walking distance of your home? Underline if you agree.**

Universal energy in nature

Birds

Ocean x 2 and mountains

Peace x 4

Sand to play in

Open space

## Counter boards from Spanish Banks

**I go to the park to .....** Relax x 3  
Play x 5

**I am more likely to take risks at the...** Beach x 4 Playground x 5

**I notice \_\_\_\_** Garbage x 6 insects x 2  
**more often in the city**

**If I spent more time exploring nature in the city my life would be \_\_\_\_\_** more x 1 less x 7 \_\_\_\_\_  
**stressful.**

**I get more from \_\_\_\_** fast x 4 slow x 4  
**activities.**

## Grass Board Quotes from Spanish Banks

**What is Nature?**

Nature is a place where plants can grow, animals have homes, and people can enjoy it.

All of it

Somewhere peaceful and away from modern life

Mountains trees and something like

this sky

Nature is butifule (Picture of butterfly and flower)

Lite fun

**What is Wilderness?**

Something you can explore, suprising/ exciting

Somewhere totally wild not controlled but beautiful

A place that is free, unrestricted by the rest of the environment/world

**What is Wild?**

Something free and beautiful that hasn't been conquered

## Sensory Box Quotes from Spanish Banks

**What do you think is in the box?**

Rubix cube x5

A stick

**Are you scared, anxious or apprehensive of anything in urban nature you come in contact with regularly? What brought on that fear?**

Being Judged x3

Rubiks cube x2

Coil of rope

Crows and angry birds

Sea weed – swimming as a child

Rug

Very scary movies

Fabric rolled up in a little bag

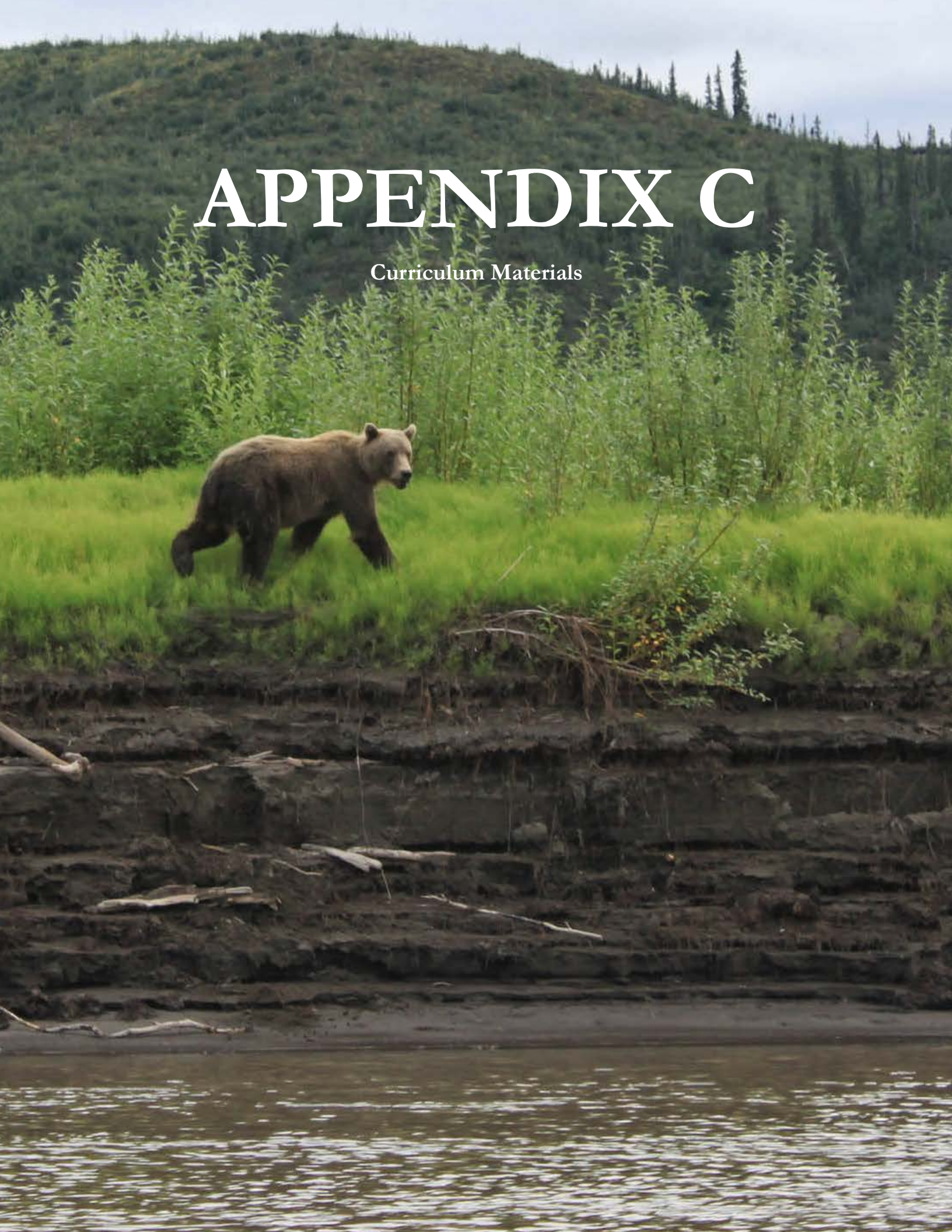
Bugs, spiders except ladybugs and butterflies





# APPENDIX C

Curriculum Materials





# Local Learning Exchange – Earthbond Prototyping

## Focus 3 Month Studio Course Rough Outline

	Discussion Topics	In Studio Assignment	Local Learning Assignment
1	<ul style="list-style-type: none"> <li>- Heuristic Research</li> <li>- Autobiographical Writing</li> <li>- Nature Defined</li> <li>- Ecologic Self</li> <li>- Unexpected Outcomes</li> </ul>	<b>Defining the Holistic Observation Tool</b> (Expanded range of awareness ) <ul style="list-style-type: none"> <li>- Conceive a technique to capture data from deep observation in nature</li> <li>- Determine the strengths and weaknesses of the technique</li> <li>- Practice session, on campus, refine</li> </ul>	<b>Holistic Observations 1</b> <ul style="list-style-type: none"> <li>- Observe nature outdoors, and capture data using the HO tool developed in class</li> </ul>
2	<ul style="list-style-type: none"> <li>- Biomimicry and Biophilia</li> <li>- Physical Progression (Familiar and Unfamiliar)</li> <li>- Risk (Tension, Opportunity)</li> <li>- Scaling (Time and Perspective)</li> </ul>	<b>Progression 1</b> <ul style="list-style-type: none"> <li>- Define a relationship between Nature and Design you wish to explore</li> <li>- Define a exploration choosing where to progress (toward unfamiliar)</li> <li>- Speculate risks, outcomes, and design required to access these places</li> </ul>	<b>Holistic Observations 2</b> <ul style="list-style-type: none"> <li>- Observe nature in chosen familiar area (yard), capture data using HO tool</li> <li>- Embrace the unexpected or Intervene in the area, highlighting a relationship between design and nature</li> </ul>
3	<ul style="list-style-type: none"> <li>- Experience Prototyping Discover, Loosen and Flirt with Control</li> <li>- Seeking Immersion</li> </ul>	<b>Fast Design Charrette for Slow Design</b> <ul style="list-style-type: none"> <li>- Develop an experience prototype speaking to the relationship you are exploring</li> <li>- This prototype will stay in context for the entire term</li> <li>- Will time highlight unexpected relationships with the community, nature and environment?</li> </ul>	<b>Experience Prototype 1</b> <ul style="list-style-type: none"> <li>- Finish planning design</li> </ul>
4	Work Session	<b>Experience Prototype 1</b> <ul style="list-style-type: none"> <li>- Build experience prototype 1</li> </ul>	<b>Experience Prototype 1</b> <ul style="list-style-type: none"> <li>- Place in context and observe</li> <li>- Adapt Holistic Observation research tool if necessary</li> </ul>
5	<ul style="list-style-type: none"> <li>- Experience Survey</li> <li>- Changing Contexts</li> <li>- Eco-phobia</li> <li>- Making With Self Originating Material and Phenomenon</li> </ul>	<b>Progression 2</b> <ul style="list-style-type: none"> <li>- Reframe the relationship defined in progression 1 for the new context.</li> <li>- Intend to engage the community whether human or not.</li> <li>- Determine a technique to ask and answer questions that is not a typical survey.</li> </ul>	<b>Holistic Observations 3</b> <ul style="list-style-type: none"> <li>- Observe nature in chosen (local park ) area, and capture data using the tool.</li> <li>- Embrace the unexpected or Intervene in the area, highlighting a relationship between design and nature.</li> </ul>

6	Work Session	<b>Experience Survey 1</b> <ul style="list-style-type: none"> <li>- Design</li> <li>- Build</li> <li>- Adapt Holistic Observation research tool if necessary</li> </ul>	<b>Experience Survey 1</b> <ul style="list-style-type: none"> <li>- Place in context</li> <li>- Adapt if needed for following week</li> </ul>
7	Offsite Studio	<b>Experience Survey 2</b> <ul style="list-style-type: none"> <li>- Spend the entire studio session observing, interacting and collecting data</li> </ul> <b>Holistic Observations 4</b> <ul style="list-style-type: none"> <li>- Observe nature in chosen (local park ) area, and capture data using tool.</li> </ul>	
8	<ul style="list-style-type: none"> <li>- Animism</li> <li>- Curriculum of Place</li> <li>- Earthbond Prototyping</li> <li>- Attending and Intuition</li> </ul>	<b>Progression 3</b> <ul style="list-style-type: none"> <li>- Re frame the relationship defined in progression 1 and 2 for the new context</li> <li>- Intend to engage personally with nature and share what the place had to teach</li> </ul>	<b>Holistic Observations 5</b> <ul style="list-style-type: none"> <li>- Observe nature in chosen familiar area (yard), capture data using HO tool</li> </ul>
9	Work Session	<b>Experience Prototype 2</b> <ul style="list-style-type: none"> <li>- Design charrette to develop an experience prototype for the unfamiliar context.</li> <li>- Build</li> </ul>	<b>Experience Prototype 2</b> <ul style="list-style-type: none"> <li>- Finish planning, design and build of experience prototype</li> </ul>
10	Offsite Studio	<b>Holistic Observations 6</b> <ul style="list-style-type: none"> <li>- Observe nature in chosen (unfamiliar) area, and capture data using tool.</li> </ul> <b>Earthbond Prototype 1</b> <ul style="list-style-type: none"> <li>- Embrace the unexpected or Intervene in the area, highlighting a relationship between design and nature.</li> </ul> <b>Holistic Observations 7</b> <ul style="list-style-type: none"> <li>- Collect slow experience prototype from familiar (yard) to bring to class.</li> </ul>	
11	<ul style="list-style-type: none"> <li>- Synthesis</li> <li>- Engaging Control</li> </ul>	<b>Mapping Design Charrette</b> <ul style="list-style-type: none"> <li>- Students bring copies of all research, photography, illustration and observations to cut up and ma.</li> <li>- Chronological, Emotional, Ethical, question based, mapping charrette</li> </ul>	<b>Presentation of Earthbond Prototype</b> <ul style="list-style-type: none"> <li>- Choose any technique to share insights</li> <li>- Present ideas from Holistic Observations or experience prototyping.</li> <li>- Focus on changes in ethical/ moral stance on design and nature</li> </ul>
12	- Final Presentations	<b>Critique</b>	



# Local Learning Exchange – Immersion Focus

## 2 Week Condensed Course Rough Outline – Sea Kayak

	Trip Stage Overview	Design and Nature Topics	Design Charrettes & Assignments	Description
At outdoor centre or on campus				
1	<ul style="list-style-type: none"> <li>- Overview</li> <li>- Ice breaker</li> <li>- Trip &amp; Policies</li> <li>- Objectives</li> </ul>	<ul style="list-style-type: none"> <li>- Designs Role in Nature Immersion</li> <li>- Heuristic Research</li> <li>- Autobiographical Research</li> <li>- Nature defined</li> <li>- Ecologic Self</li> </ul>	<b>Holistic Observations 1</b> - This will be used daily throughout the entire course to become a catalogue of insights for future use.	Develop a multi method technique to capture data from deep observation in nature. (expanding the range of awareness) Determine the strengths and weaknesses of the techniques chosen, practice session, refine or adapt
2	<ul style="list-style-type: none"> <li>- Trip Prep:</li> <li>- Menus</li> <li>- Group Equip</li> </ul>	<ul style="list-style-type: none"> <li>- Changing Contexts</li> <li>- Effect of Framing</li> <li>- Scaling Time and Perspective.</li> </ul>	<b>Design Food Challenge 1</b> <b>Holistic Observations 2</b>	Group Design charrette for planning, creating, cooking, a meal on trip. Groups must collect and take into account all food allergies..
3	<ul style="list-style-type: none"> <li>- Navigating Paddling skills Leave no Trace Ethics</li> </ul>	<ul style="list-style-type: none"> <li>- Control (Discover, Loosen)</li> <li>- Making With Self Originating Material</li> </ul>	<b>Design with Natural Materials 1</b> <b>Holistic Observations 3</b>	Design charrette focused on using at hand natural materials to share ideas.
4	<ul style="list-style-type: none"> <li>- Trip Prep: Personal Equip</li> </ul>	<ul style="list-style-type: none"> <li>- Physical Progression</li> <li>- Familiar and Unfamiliar</li> <li>- Risk (Tension, Opportunity)</li> <li>- Experience Prototyping.</li> </ul>	<b>Design Equipment 1</b> <b>Holistic Observations 4</b>	Develop a piece of personal equipment to test on trip. How can it be tested beforehand, what are its limitations?
5	<ul style="list-style-type: none"> <li>- Trip Safety</li> <li>- Wood Science</li> <li>- Packing</li> </ul>	<ul style="list-style-type: none"> <li>- Rift</li> <li>- Eco-phobia</li> </ul>	<b>Design Food Challenge 2</b> <b>Holistic Observations 5</b>	Fires and fire starting design challenge. Attempt to start a fire without matches, lighter, flint and steel.
Kayak Trip begins				

6	Trip 1, Transport, Camp set up	-Biomimicry -Designing for Biophilia	<b>Encountering Adverse Conditions 1</b> <b>Holistic Observations 6</b>	Speculative design charrette; conditions to expect on trip.
7	Trip 2, take down, move set.	-Seeking Immersion Unexpected Outcomes Bio-inclusive Design	<b>Design with Natural Phenomenon 1</b> <b>Holistic Observations 7</b>	Design charrette focused on using at hand phenomenon to generate iterations for design.
8	Trip 3, take down, move set	-Intuition (Just do it)	<b>Encountering Adverse Conditions 2</b> <b>Holistic Observations 8</b>	Facilitators remove 50% of paddles before students are awake. They must adapt and come up with solutions for the entire day.
9	Trip 4, rest day	-Attending, be bored, meditate, follow a path, act	<b>Earthbond 1 (Design with Natural Materials 2, Phenomenon 2 &amp; Encountering Adverse Conditions 3)</b> <b>Holistic Observations 9</b>	Shelters and shelter building challenge, sleep under the stars, to experience adverse conditions.
10	Trip 5, take down, move set	-Animism -Curriculum of Place - Earthbond Prototyping	Community Initiatives <b>Holistic Observations 10</b>	
11	Trip 7 – Return transport, close			
On campus				
12	Rest day/ sprint begins in evening	-Synthesizing -Engaging Control	<b>Earthbond 2</b> 60 hour group design sprint	Focus on a relationship between design and nature shared between all members during Holistic Observations 1 – 10. As a group develop, prototype and present the outcome for studio critique.
13	Sprint continues	-	<b>Earthbond 2 Cont'd.</b> 60 hour group design sprint	-
14	Sprint ends	-	<b>Presentations and Closing</b>	



# Project 1: Holistic Observations

## Capturing Heuristic Design Research

Course Title

Local Learning Exchange – Earthbond Prototyping

### Project Context:

Contemporary designers bring a broad range of skills to any design situation. These skills represent the deep thinking within design that show an ability to change scope, perspective, question behavior, and share reasoning that directs design decisions. To reach these abilities designers must consciously choose to experience situations in new ways capturing information from all cognition that takes part in how we perceive relationships within an experience. This means employing strategies to develop senses, actions, thoughts, and feelings (Buchenau et al, 2000, Bai, 2012) that can be directed toward further designing or research. It takes practice for this mode of sensing to become intuitive, and the development and use of this tool is intended to help trigger that practice.

### Project Overview:

Develop a strategy for a form of data collection that allows you to grasp the subjective; that is emotion, feeling, sensing and thought that is necessary to be immersed in an environment. Include aspects that capture the narrative. Narratives are a powerful and inclusive way to share insights that develop direct sentient engagement with the environment and all its “ecological relations” (Hasebe-Ludt, 2009, p.29). This strategy will become a practiced research tool throughout the term (a template) that supports, exploring new surroundings, seeking new perspectives and multi-sensorial engagement with nature. Detail any developments in the form of the tool and demonstrate why it is a valid structure for heuristic inquiry, “an exploratory approach to research...concerned directly with human knowing” (Hiles, p.389). How does the tool share a “systematic way of incorporating the self into inquiry methods while ensuring a high level of reflexivity and transparency?” (Hiles, p.392)

**Do not pursue** a purely objective approach seeking to capture only ideas to develop for future design. Some categories to consider to help you move away from this thinking are; Smell, hear, taste, touch, changes over time, motion, sequence of events, questions, difficulties, feelings, motivation, actions, and conversation.

### Project Learning Outcomes

As a result of successfully completing this project, students will:

- think divergently, and take risks in expressing qualitative data
- discover relationships between design and nature
- develop a tool that can become used in practice for reflection and dissemination
- foster engagement with a dynamic or unpredictable environment
- experience changing contexts allowing for a focus on process, tacit knowledge and immersion

### Holistic Observations – Grading rubric

Development	<b>Conceives a technique to capture data from deep observation in nature.</b> <ul style="list-style-type: none"> <li>- Clearly describes the intent of the tool and evaluates in writing (500 words max) the strengths and weaknesses of the technique.</li> <li>- Format supports capturing emotion, feeling, sensing and thought in diverse ways.</li> <li>- Creatively incorporates a systematic way of capturing self into inquiry methods</li> </ul>	/10  /5 /5	/20
Holistic Observations	<b>Observe nature, and captures data using the HO tool to be scanned and posted on the course Moodle on dates specified in the course syllabus.</b> <ul style="list-style-type: none"> <li>- Level of detail observed and care in visual observations whether drawings photographs, observations.</li> <li>- Appropriate use of sensory, observational, reflective writing</li> <li>- Can be clearly understood and navigated</li> </ul>	/20  /20 /20	/60
Final Presentation	Clearly shares the influence of the HO tool on the final deliverable		/20
	Late assignments: – 2%/day at day ten – 100%		
	<b>FINAL GRADE</b>		100%

## Project 2: Making with Self Originating Materials and Phenomenon (Shelter Building)

Course Title	Local Learning Exchange – Kayak Trip
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### Project Context:

Making with self originating materials allows students to build an inventory of tacit knowledge, challenge creativity through the restrictions of the materials and explore habitats while collecting and intervening with the environment around them.

### Project Overview:

In a group of four develop a design and build a shelter to sleep in for the night out of natural building materials supplied around you. Strongly consider what impact you are having on the environment before acting. It is not acceptable to kill/impede sentient or non-sentient beings, consider how you will dismantle the shelter the following morning. The facilitator may introduce ropes, tarps, and other artifacts dependent on the environment and supplies available.

### Project Learning Outcomes

As a result of successfully completing this project, students will:

- think divergently, and take risks in material exploration
- discover the value and difficulty in making your own shelter in dynamic or unpredictable environments
- become resourceful and creative while exploring habitats
- recognize their impact on local ecology
- experience changing contexts allowing for a focus on process, tacit knowledge and immersion

### Shelter building – Grading rubric

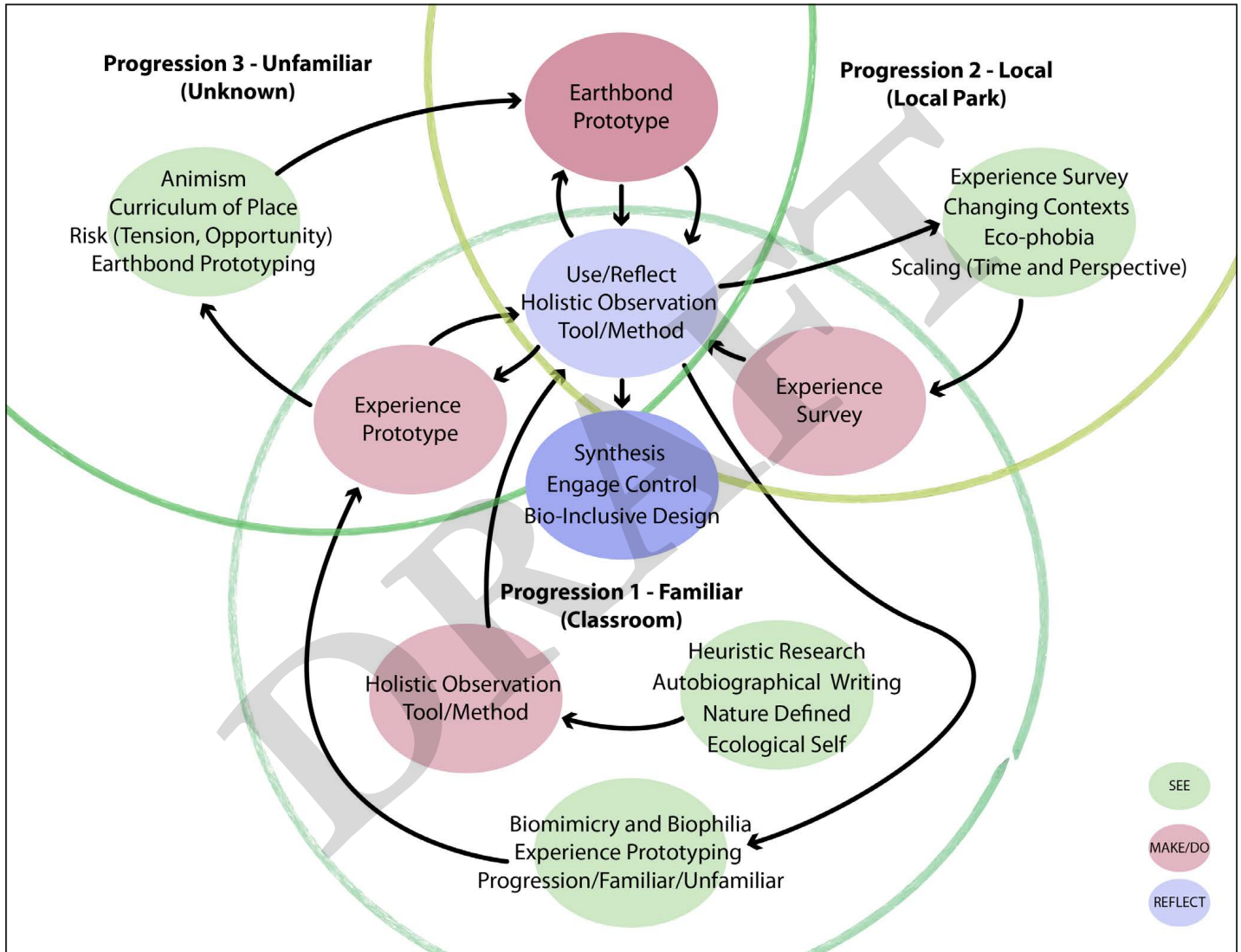
Teamwork, Process, and Ethics	Effectively uses the allotted time to develop and build an appropriate shelter Creativity in material use and exploration Ethical use of materials, location and destruction	/20 /10 /10	/40
Presentation 1 (Before use)	Clearly shares the process and insights while developing the shelter in a creative format (skit, poem, visuals...) Shares expected outcomes	/10 /10	/20
Presentation 2 (After use)	Clearly shares the narrative of overnight experience in a creative format (skit, poem, visuals...) Shares the difference in expected outcome and reality	/10 /10	/20
Participation	Actively involved in decision making, building and presenting	/20	/20
<b>FINAL GRADE</b>			100%

*“Forget not that the earth delights to feel your bare feet and the wind longs to play with your hair.” Kahlil Gibran*



# Earthbond Prototyping

## Possible Flow Diagram









Cover Image: Standing atop old growth stump in flooded Stave Lake B.C.